

SOUTH CAROLINA MARINE FISHERIES, 1995

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INTRODUCTION

This report is a summary of significant events in South Carolina's marine fisheries during 1995. Its objectives are to 1) update and describe trends in the principal fisheries and 2) provide explanatory information relevant to important developments. The discussion is somewhat subjective in interpretive content, but represents consensus views of the supervisory staff of the management programs for the various fisheries. The presentation is directed at a general audience, makes some simplifications, and is not meant to be definitive in the scientific sense.

Publication of landings data for South Carolina's commercial fisheries began in January, 1957, and was based on a monthly reporting system established by the U.S. Fish and Wildlife Service (USFWS). Distribution of information was in the form of monthly bulletins.

At that time, from 75 to 80 seafood dealers operated along the coast. Monthly production forms were mailed to these individuals during the last week of the month, on which they were asked to report their landings for that month. These data were then compiled by fisheries reporting specialists and submitted to the Washington, D.C. office of the USFWS. Additional data were provided by the state's Division of Commercial Fisheries. The specialists also prepared monthly narrative reports describing current conditions and trends. This series was discontinued at the end of 1979.

The current series of annual reports was initiated in 1987. The first issue contained a review of trends and events for 1977-1986. Individual annual reports began with the 1987 issue. The narrative is similar in format to that of the former monthly bulletins.

Data on commercial fisheries catch, effort, and landed value were obtained through 1) mandatory monthly reports submitted by licensed primary wholesale dealers, 2) mandatory shellfish harvest reports, 3) voluntarily submitted weekly shrimp tickets from dock operators, 4) voluntarily submitted offshore fish trip tickets from wholesalers, and 5) reports required in special permit fisheries.

Annual fishing effort by gear type was usually estimated by dividing total landings compiled from all sources by the average volume landed per trip (CPUE). CPUE was calculated from information submitted on shrimp tickets, fish tickets, or special permit harvest reports. The percentages of total landings reported in this detail, and thus the accuracy of the overall effort estimates, varied considerably according to gear type.

Commercial landings were for wild stock fisheries only. The state's mariculture industry produced 957,000 pounds of product worth \$3.84 M. Production of Pacific white shrimp was 673,000 pounds (heads-off) worth \$2.02 M, nearly identical in volume to 1994's output. Unit value, however, was appreciably lower. Clams comprised most of the remaining mariculture production.

Commercial landings data were subject to confidentiality if less than three sources provided information. Appreciable volumes of product were involved in some cases. If three or four dealers handled an item, but only one accounted for most of the volume, this information was also treated as confidential. Confidential data were included in the summaries of total landings.

Reliability of commercial landings data is subject to the perception of under-reporting to avoid taxes and regulations. State law restricts the use of such information to fishery management purposes only and it cannot be made available otherwise, except by court order. It has been customarily assumed that providers, particularly in a voluntary format, have little incentive to submit false reports. Verification of submitted information was therefore seldom practiced, except where obvious anomalies were detected.

Because of health-related considerations, shellfish landings were reported in detail and closely monitored. This information is considered to be very accurate. Most of the shrimp landings were reported on weekly tickets which provided detailed information on a voluntary basis. These data were also considered to be highly reliable. Some subjectivity was involved in assigning the landings geographically (i.e., by statistical zone).

Federal reporting requirements for offshore fish fisheries have become progressively more extensive and detailed in recent years. Many of the data elements formerly obtained through the state trip ticket system have been incorporated in these reports and are no longer submitted to the Marine Resources Division (MRD). As a result, the estimates (e.g. CPUE and effort) generated from the state database are not as reliable as in former years.

Landings for 1995 in most product categories other than shrimp were obtained primarily from monthly dealer reports. The statistics for blue crab and shad presumably were subject to significant under-reporting, based on anecdotal information. It also was likely that incidental catches of fish by shrimp trawlers were underestimated: these typically belonged to the crews and were not distributed through wholesale dealers.

The major source of recreational fishery data was the Marine Recreational Fishery Statistics Survey (MRFSS), conducted under NMFS oversight. This was a generalized survey of hook and line fishing from shore or shore-based facilities, charterboats, and

private boats. The headboat fishery was not included and is addressed in a separate section.

A telephone survey of randomly selected coastal households was used to obtain information on participation and effort. An on-site intercept survey (creel census) conducted by the MRD provided data on catch composition, species catch rates, detailed effort data, and length distribution. Results from both activities were combined by the NMFS to generate estimates of total catch by species, fishing modes, seasons, and fishing areas.

The MRD conducted a State Finfish Survey (SFS) in conjunction with the MRFSS. Coverage was directed at private boat fishermen fishing in inland areas. The principal objectives were to expand the sample sizes for length measurements and CPUE observations of important recreational species such as red drum and spotted seatrout.

State law required operators of piers, charterboats, and headboats to obtain permits and submit monthly reports of their fishing activities. Pier operators reported the numbers of anglers using their facilities each day. This information was submitted on a monthly calendar.

The charterboat report consisted of logbook sheets completed for each fishing trip, listing the date fished, number of anglers, hours fished, numbers of fish by species kept and released, and pounds of fish retained. Many operators also voluntarily provided information on location fished, method employed, and species targeted.

Since headboats were required by federal regulation to submit trip reports to the NMFS, their state obligation was satisfied by sending copies of these to the MRD. The information elements were essentially the same as for the charterboat fishery. The NMFS Beaufort Laboratory had the federal responsibility for processing these data and the MRD therefore relied on summary information provided by them.

No directed monitoring efforts were made for shellfish. Based on results of a 1994 survey of marine fishing stamp holders, rough estimates of total recreational landings could be made. These were based on commercial landings and are therefore noted in the appropriate section on commercial fisheries.

A survey of the shrimp baiting fishery has been conducted each year since 1987. Results of the 1995 survey are described in a separate data report (Low 1996). A brief summary is included in the discussion of the commercial shrimp fishery.

COMMERCIAL FISHERIES

Product categories were composed as follows. Shrimp landings included whole (heads-on) weights of all penaeid species; no rock shrimp landings were reported during 1995. Crab landings included live weights of various categories of blue crab and pounds of stone crab claws. Shellfish landings were expressed in weights of meats with the equivalent volume in U.S. bushels (oysters and whelks) or 250-count bags (clams) of whole product noted where appropriate. Squid and octopus were included in aggregate shellfish meat landings.

Most fish landings were reported in round (whole) weights. Carcass weights applied for swordfish and large sharks. Shark fin weights were converted into whole (animal) weights with sharks taken on offshore gear being included in offshore fish totals and those from inshore fisheries being tabulated under coastal fish production. Offshore fish included wreckfish, king mackerel, oceanic pelagics (dolphin, wahoo, and tunas), swordfish, and reef fish (primarily groupers, snappers, porgies, tilefishes, and sea bass). Coastal fish consisted of mullet and inshore groundfishes, e.g. spot, whiting (kingfish), and flounders. River fish were mainly American shad and river (blueback) herring.

Except where noted, all value figures refer to ex-vessel value, i.e., the amount paid to the harvester. For trend analysis, these have been adjusted by weighting factors based on the annual Consumer Price Index (CPI). These are referred to as inflation-adjusted values and are expressed in 1995 dollars.

South Carolina is not a major producer of marine fisheries products. In 1995, the state ranked 19th in volume and 20th in value of overall seafood production (including mariculture) among the 23 coastal states (Fig. 1). In Fig. 1, the data for Alaska (\$1,432 M) are not included and the figures indicated include mariculture production. Most of the landings were shipped out of state as raw or unprocessed products, so the local economy received little benefit from value added.

In FY 1994/1995, there were 277 licensed primary wholesale dealers (one less than in 1994). The 1994 annual report provided a detailed description of their operating characteristics. In 1995, employees included 302 in management/clerical/sales, 156 dockworkers, 68 drivers, and 34 people in maintenance/engineering. Processing workers included 193 shrimp headers, 51 shellfish shuckers, 51 crab pickers, 49 fish cutters, and 20 others. Employment in all positions except fish cutter was higher than in 1994 (Fig. 2).

It was difficult to accurately determine the number of commercial fishermen. In order to legally land product, an individual had to possess either a trawler captain's license or a

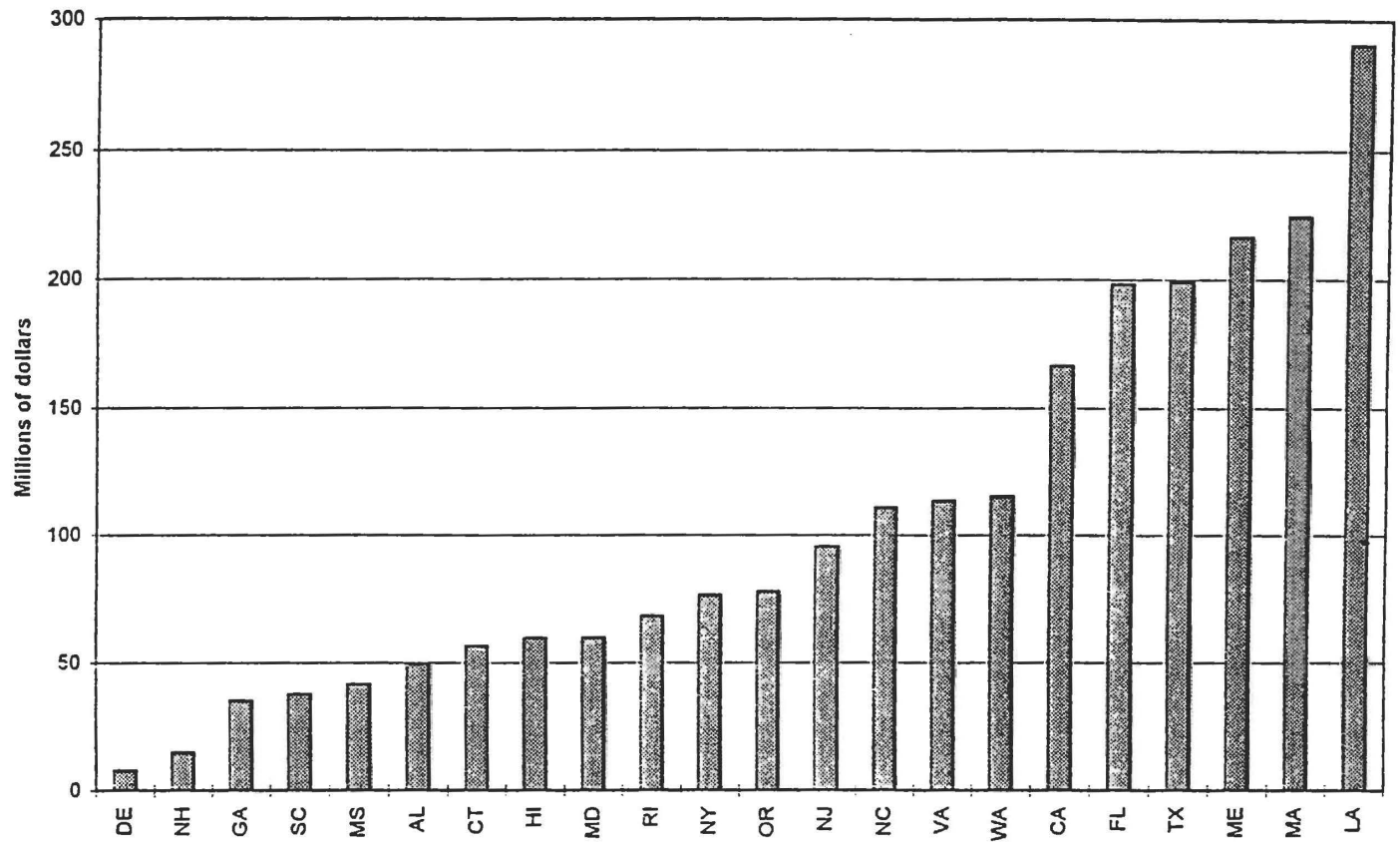


Fig. 1. Landed value of seafood production in 1995 by state.

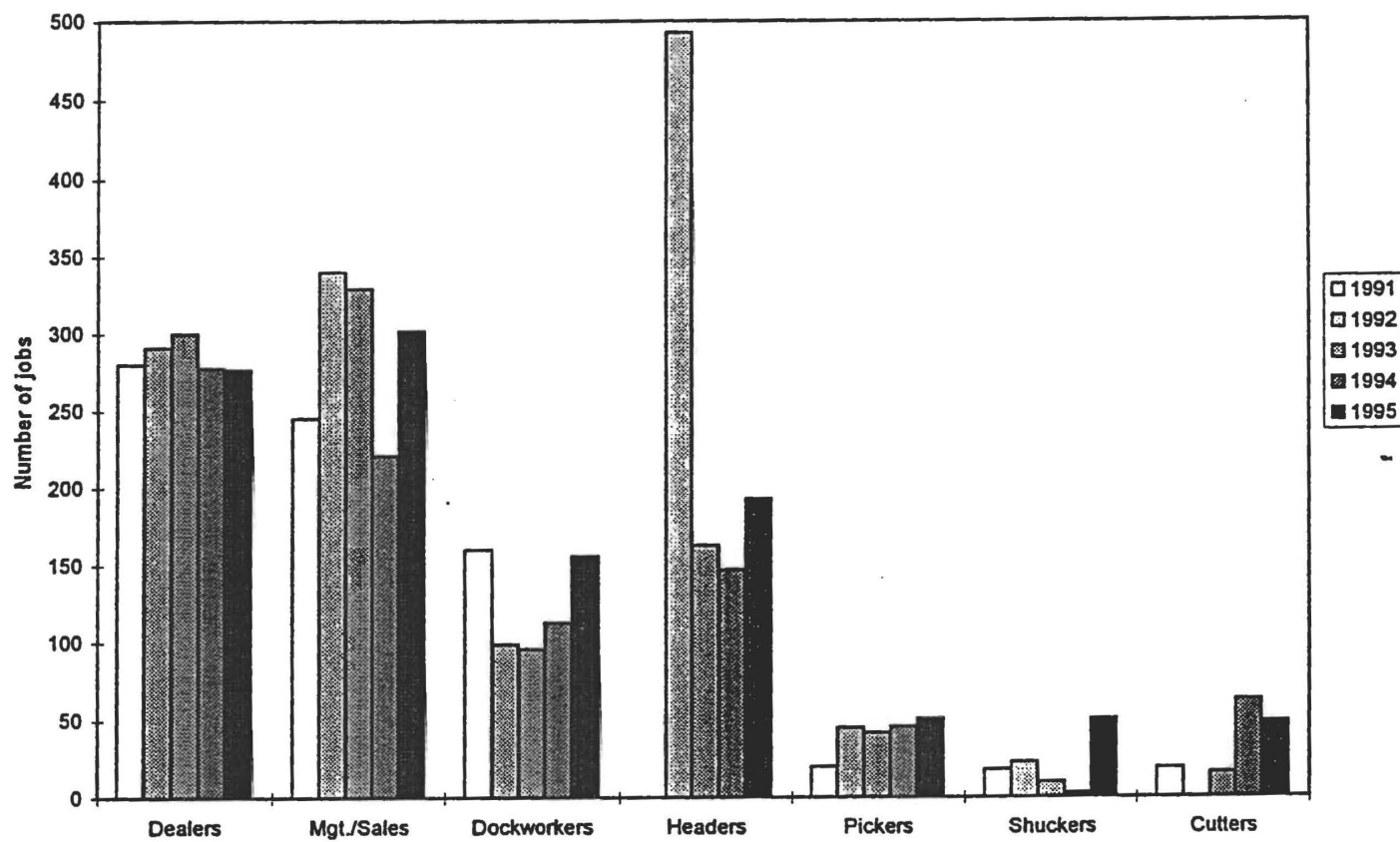


Fig. 2. Seafood dealer employment.

land and sell license. In FY 1994/1995, there were 913 trawler captain and 641 land and sell licenses issued. Additional licenses were required for units of gear and/or participation in various fisheries. For example, there were 292 shellfish harvester and 387 crab pot licenses sold. Since many individuals obtained several of these in addition to the land and sell or trawler captain's licenses, the totals were not additive. Crewmembers in most fisheries were not required to have any type of license.

The 1994 report described procedures used to roughly estimate the numbers of individuals associated with each major fishery with a total of about 2,000 presumably employed in the harvesting sector. These estimates appeared to be appropriate in 1995 as well.

Total landed volume from wild stocks was 23.092 M pounds, the highest since reliable reporting was initiated (Fig. 3) and 132% of the 15-year (1980-1994) average (Fig. 4). Most of the increase was attributable to record shrimp landings. Blue crab production, the best since 1979, was also well above average. Shellfish landings, primarily of oysters and whelks, continued to improve and were the highest since 1985. Minor declines in coastal and offshore fish production were offset by a substantial increase in American shad catches and landings of river herring.

Total landings were worth \$34.077 M, representing an appreciable increase in inflation-adjusted, ex-vessel value after a lengthy period of no net growth (Fig. 5). The principal contributor was shrimp (63% of total landed value) (Fig. 6). Minor declines from 1994's level applied to blue crab, shellfish, and offshore fish, while the value of river fish landings doubled.

South Carolina's commercial seafood industry is heavily dependent upon estuarine resources, such as penaeid shrimp, blue crab, oysters, and clams. Juveniles of several important offshore fish species, e.g. gag grouper, also inhabit the estuaries, although the extent of their dependence on this habitat is not well documented. Total seafood production has closely reflected the contribution of estuarine components, which in 1995 was 18.6 M pounds worth \$28.1 M.

Charleston County was the leading producer with 45% of the total landed value, excluding mariculture (Fig. 7). It led in shrimp landings with 2.81 M pounds (heads-off) worth \$9.26 M. It was the major producer of wreckfish and swordfish with total offshore fish landings of 1.25 M pounds worth \$2.42 M. Hard blue crab volume was 3.22 M pounds valued at \$2.08 M. The county dominated oyster production with 62,000 bushels (\$725,000). It also contributed most of the whelk landings (over 28,000 bushels). Total ex-vessel value was \$15.39 M. Charleston County operations also accounted for nearly all of the state's mariculture production.

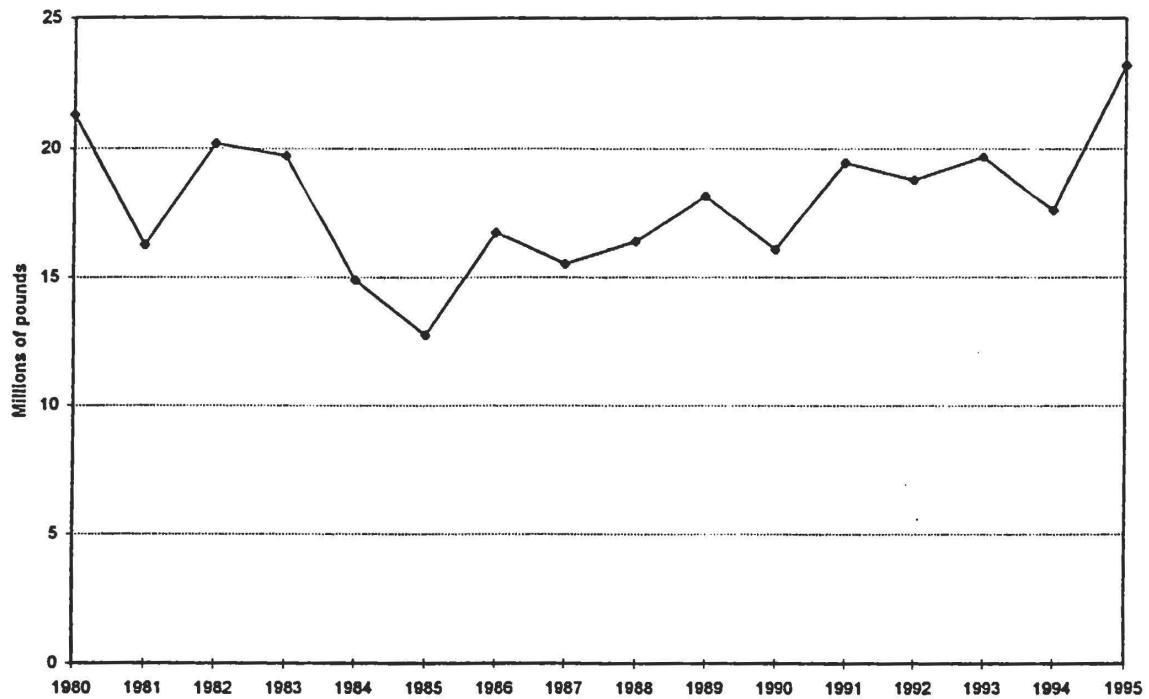


Fig. 3. Total weight of commercial marine fisheries products.

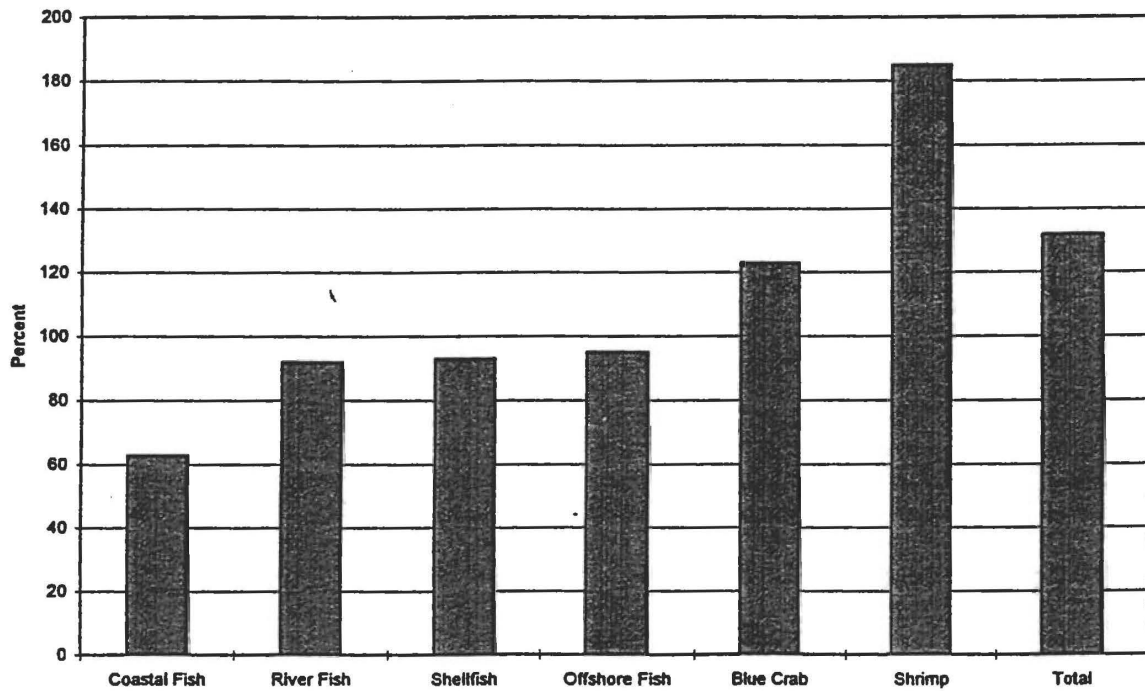


Fig. 4. Production compared to 15-year averages.

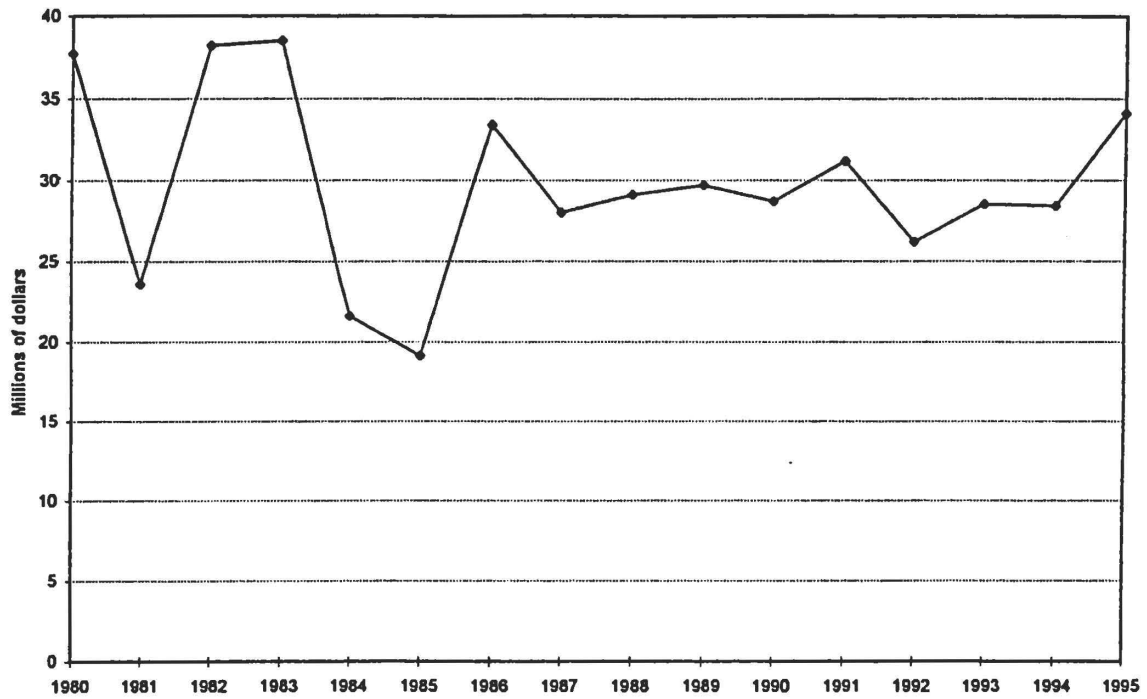


Fig. 5. Total ex-vessel value adjusted for inflation in current dollars.

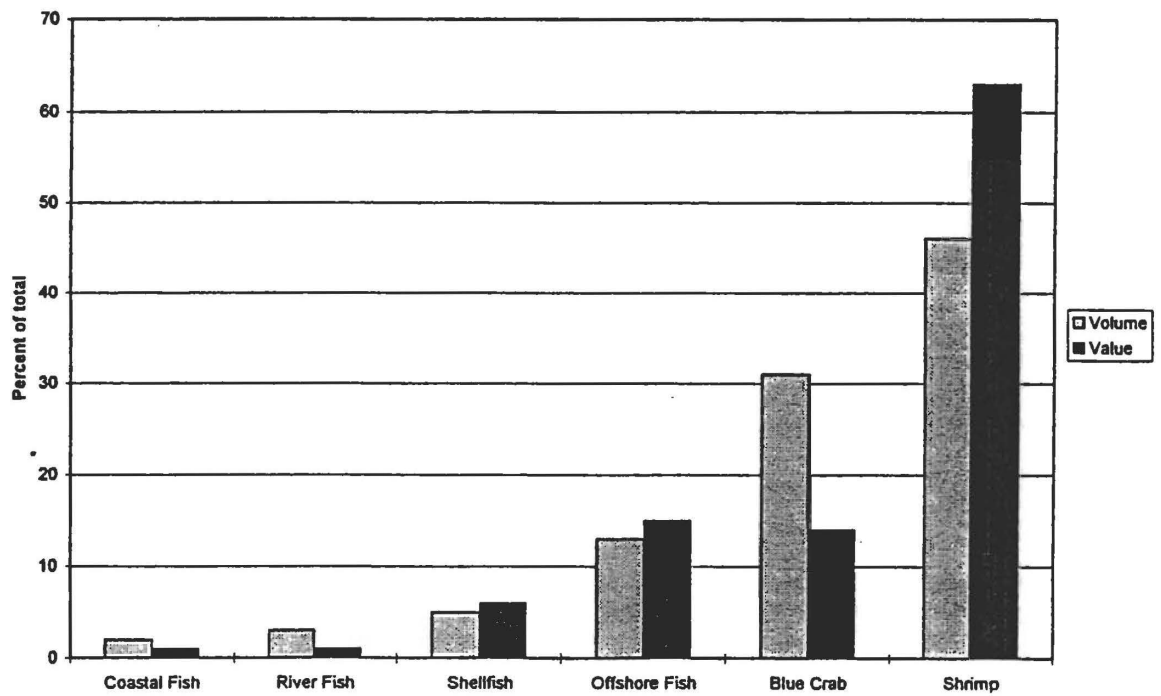


Fig. 6. Weight and value composition of commercial landings.

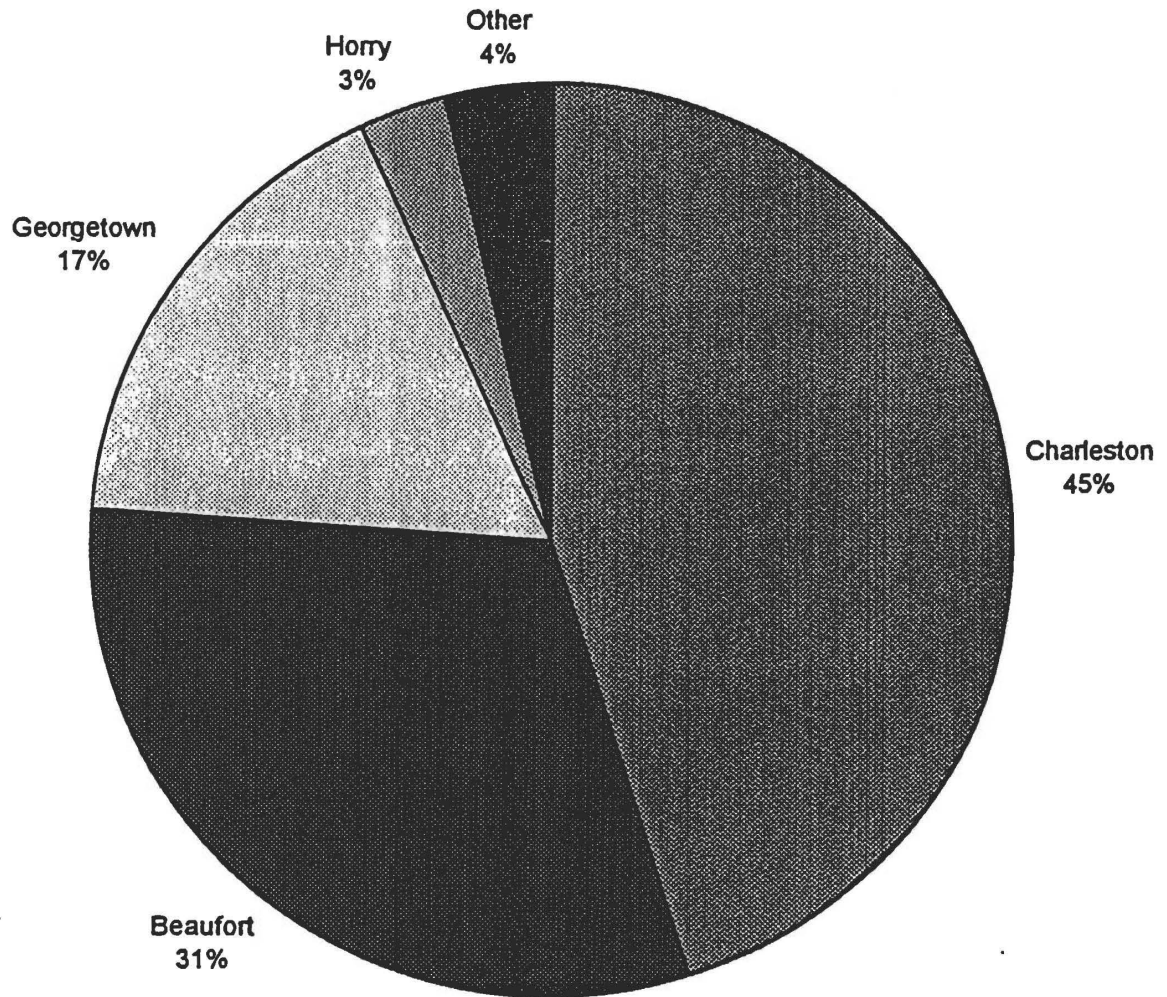


Fig. 7. County distribution of landed value.

Beaufort County produced \$10.47 M from wild stock harvest. Leading components were shrimp (2.35 M pounds heads-off worth \$7.70 M) and hard blue crab (3.28 M pounds valued at \$1.96 M). About \$400,000 worth of shellfish came from Beaufort County.

Georgetown County harvesters landed \$5.80 M worth of seafood. Principal components were shrimp (1.22 M pounds heads-off) worth \$3.26 M and offshore fish (1.07 M pounds) valued at \$1.74 M.

Nearly all of Horry County's landings consisted of fish with offshore reef species predominating. Offshore fish (1.03 M pounds) contributed \$1.00 M to the county total of \$1.05 M.

SHRIMP

Penaeid landings were 10.6 M pounds heads-on worth \$21.6 M. Aggregate volume was a record high (Fig. 8), while inflation-adjusted value was the most since 1986 (Fig. 9). White shrimp (8.69 M pounds heads-on) accounted for 82% of the total landings with an exceptional spring "roe" harvest (1.37 M pounds heads-on) and a record fall crop. Brown shrimp landings (1.91 M pounds heads-on) were slightly below average with a relatively low unit value, due to small size.

The number of trawler licenses (819 in FY 1994/1995) was slightly higher than in the previous year with small increases in both resident and nonresident categories.

Overwintering conditions for white shrimp were favorable with mild weather. The spring was one of the driest on record. State waters between the "3 mile line" and the territorial limit were opened on May 4 with inshore waters opened on May 16. Opening day catch rates were high in most areas and roe shrimp landings in May were the best in many years.

Pre-season sampling indicated that the brown shrimp season would be early and the majority of the catch was taken between late May and early July. The dry spring and early outmigration contributed to the small size that prevailed throughout the season.

A hot, wet summer with heavy rainfall in August contributed to early seaward movement of fall white shrimp and far above average August trawl landings. The channel net/trawl season in Winyah and N. Santee Bays was delayed until October 17, due to prevalence of small shrimp, and closed on November 30. Channel net TEDs were required in deeper areas of Winyah Bay under emergency regulation. The coastal trawl season closed on January 5, 1996.

The recreational baiting fishery has developed into a major competitor for the fall white shrimp crop. Permit sales (13,919) were the highest to date with total estimated participation slightly above the previous record set in 1993. Estimated total

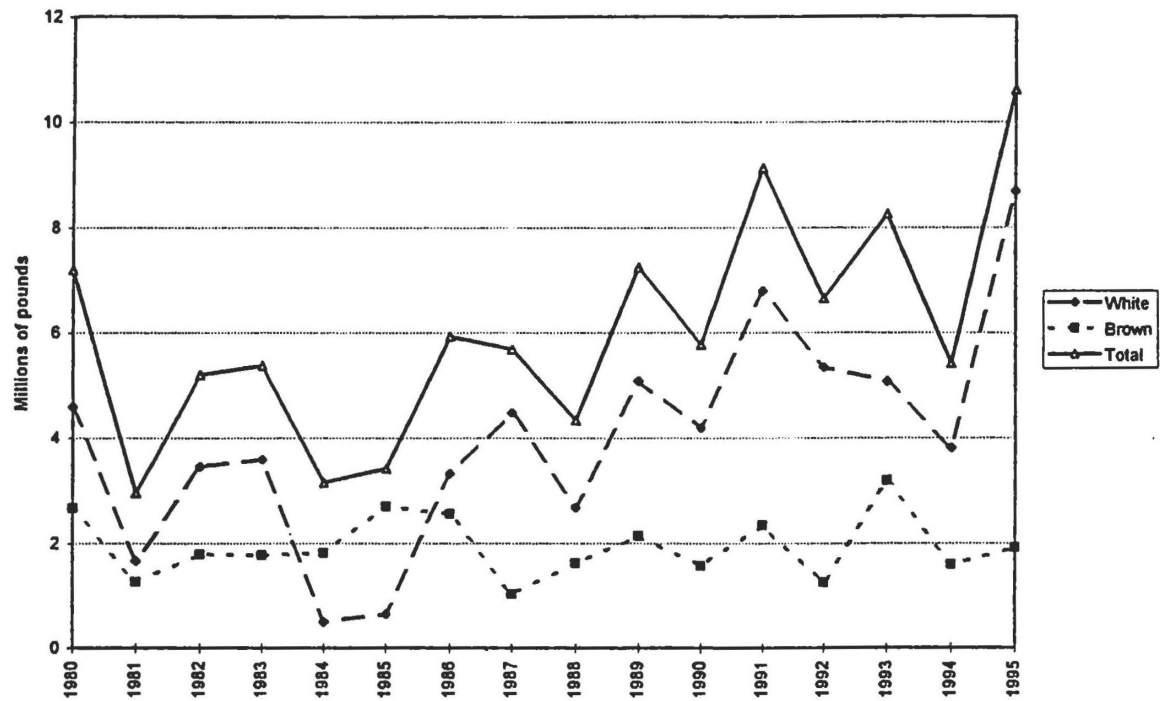


Fig. 8. Annual commercial landings (heads-on) of shrimp.

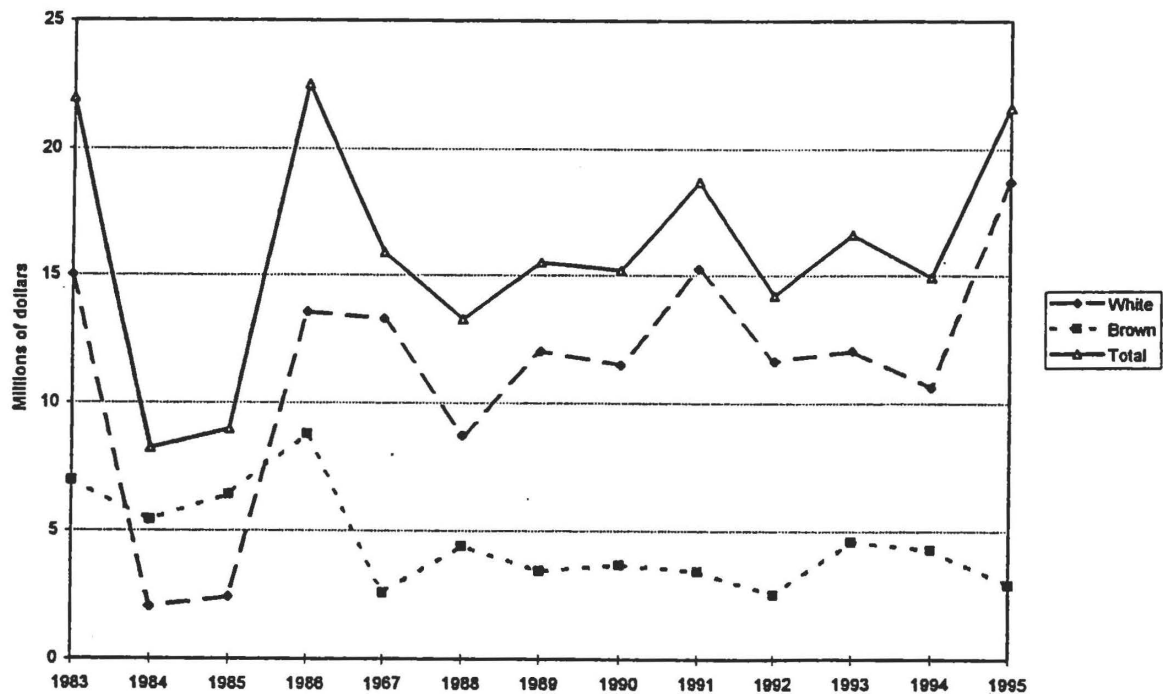


Fig. 9. Annual inflation-adjusted value of shrimp landings.

effort (81,632 trips) was also a record. Catch rates were the highest to date with Beaufort and Bulls Bay the most productive areas. The total baiting catch (3.40 M pounds heads-on) was also a record. During the baiting season (September 8 - November 9), the baiters' share was 48% of the overall catch. For the entire fall harvest, the baiters' share was 33%, nearly identical to their average since 1987.

CRAB

Pot fishermen landed 6.96 M pounds of hard crab, a relatively high yield by recent historical standards (Fig. 10). Soft or peeler landings (85,000 pounds) were also above average. The number of licensed crabbers continued a gradual upward trend.

Landed value of potted hard crab was \$4.04 M, a little below the record level of the previous year (Fig. 11). The unit price dropped somewhat, but remained strong by historical standards.

Recreational crabbers complained of reduced catches. Overall potting survey catch rates in 1995 were below average, although the CPUE for females remained stable. The recreational fishery is most active in the summer, at the end of the early season recruitment period. It has been suggested that the spring/summer commercial fishery has been taking an increasing percentage of the available crab, resulting in lower recreational catches.

SHELLFISH

Oyster production was approximately 88,000 bushels, a little below that in the previous season and the second lowest on record (Fig. 12). No abnormal reductions due to disease or closures were evident. Landed value was also among the lowest, although the average price per bushel (\$11.55) increased slightly after several years of no change. Most of the production consisted of intertidal "cluster" oysters sold locally and only four shucking houses (three in Beaufort County and one in Charleston County) were in operation. Recreational harvest was estimated at 43% of the commercial total.

About 31,000 bags (250-count) of clams were harvested. This production was lower than that in 1994 and low even by modern standards (Fig. 13). Value also was comparatively low with littlenecks averaging only 11-12 cents apiece. Escalator landings were down moderately, while hand/rake harvest increased about 38% (to about 22,000 bags). Recreational harvest was estimated at approximately 30% of this amount.

The whelk trawling season opened on February 10 and closed on April 26. Ninety three permits were issued. Landings were about 31,000 bushels worth \$317,000. Landings were comparable to those in 1982, at the early peak of the fishery, and continued the strong

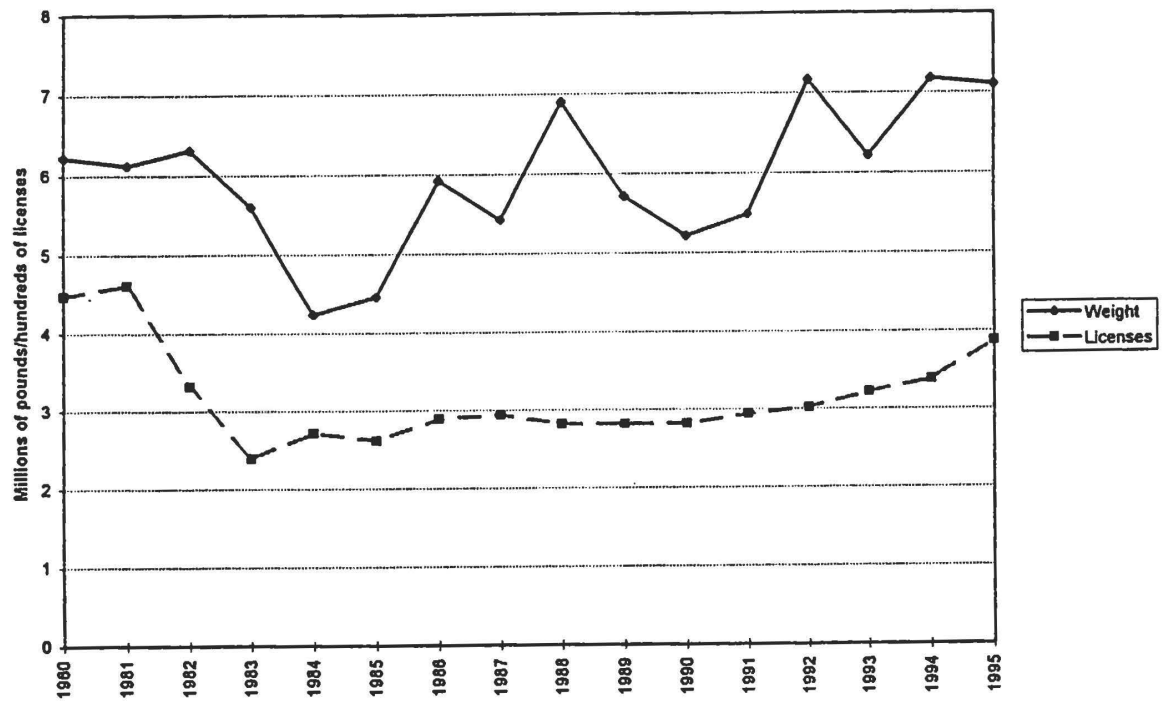


Fig. 10. Annual commercial landings of blue crab and number of crab pot licenses.

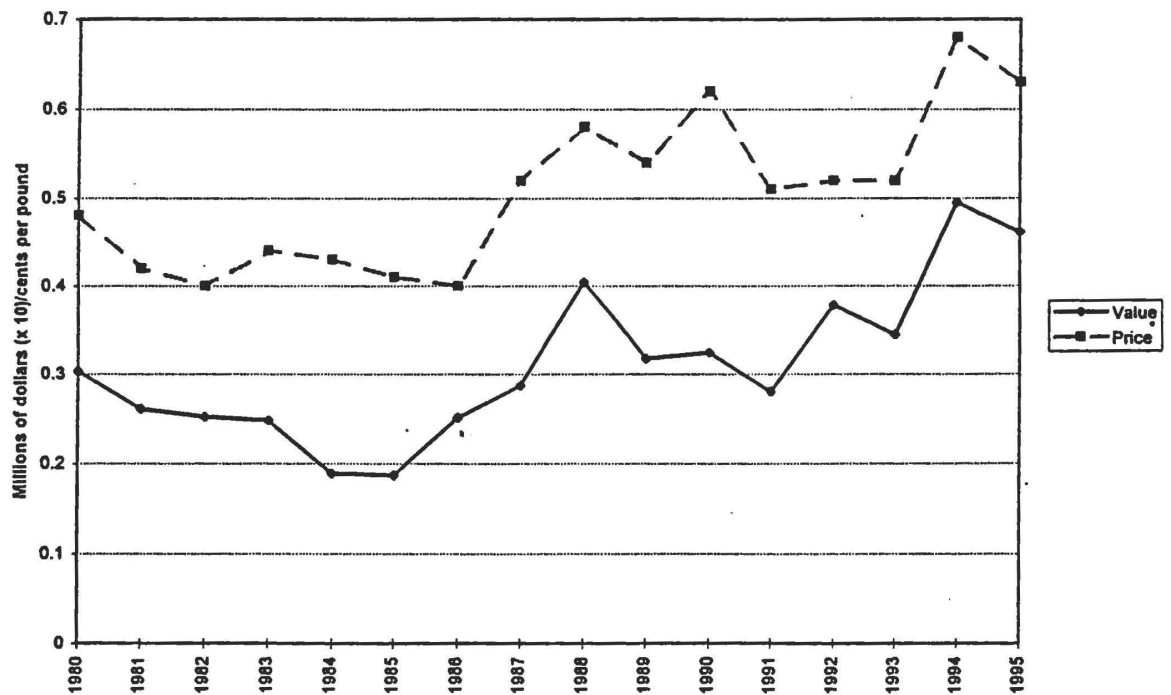


Fig. 11. Annual inflation-adjusted value and unit price of blue crab.

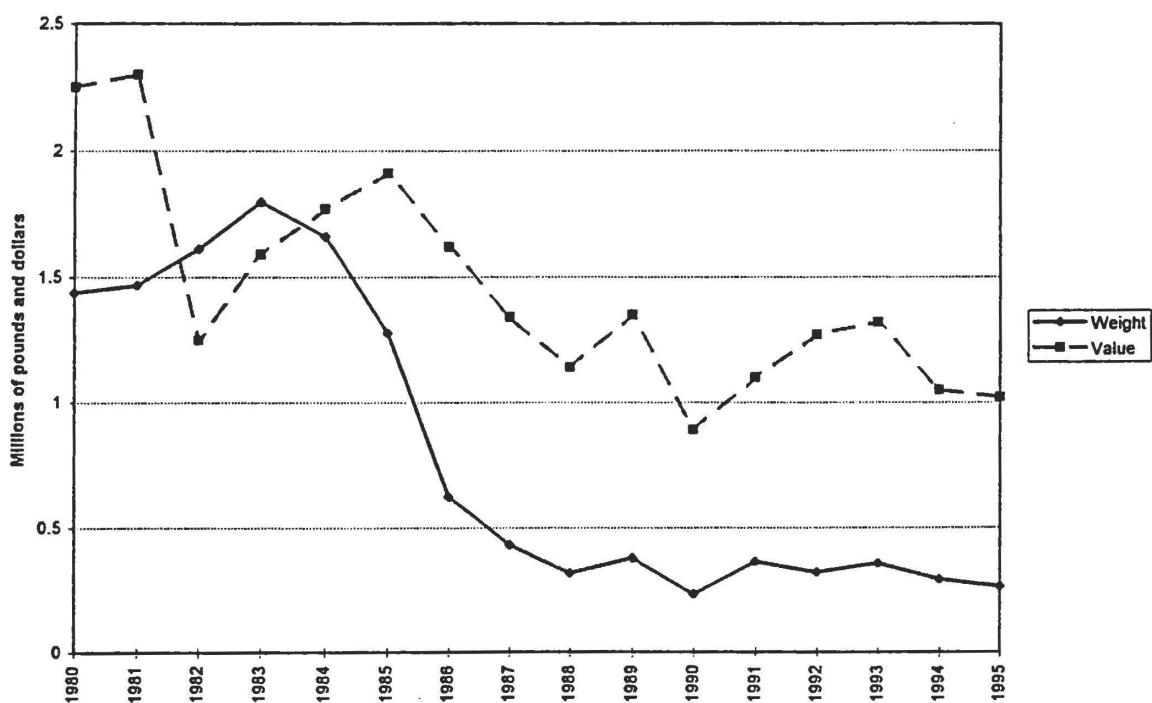


Fig. 12. Annual commercial landings and inflation-adjusted value of oysters.

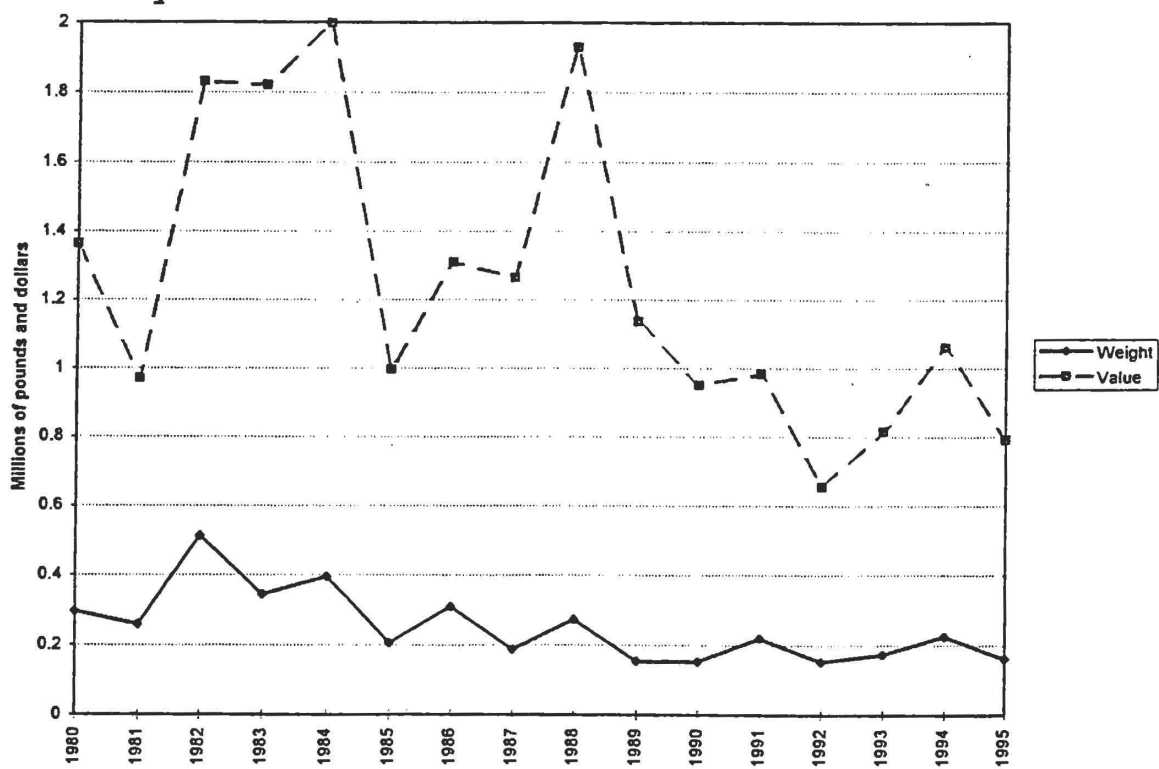


Fig. 13. Annual commercial landings and inflation-adjusted value of clams.

recovery since the mid-1980's collapse (Fig. 14). The average catch rate was 8.9 bushels per tow.

Export demand for whelks (commonly called conchs) has steadily increased, adding incentive for more fishermen to participate. Market competition has also increased with an expanding mid-Atlantic pot fishery. The mid-Atlantic fishery harvests a higher percentage of the more preferred channel whelk, whereas about 90% of the South Carolina trawl production is knobbed whelk. The legal minimum size, however, is lower in the South Carolina fishery (four inches compared to five or more for the mid-Atlantic pot fisheries).

OFFSHORE FISH

Offshore finfish fisheries are managed under several South Atlantic Fishery Management Council (SAFMC) plans. Boats landing some species are required to submit detailed trip and landings data to the NMFS. Since 1980, the state has operated a voluntary trip ticket system to monitor landings. A port sampling program to collect length measurements from fish of priority species has been conducted more or less continuously since 1977.

The NMFS Trip Interview Program (TIP), which has collected detailed trip information and length measurements, was initiated in South Carolina in 1983. During 1995, the major emphasis was on collection of length data for reef species with the trip information component (used to define catch per unit of effort or CPUE) being phased out as the NMFS logbook program expanded. Fish from 123 trips were sampled, including 72 snapper reel, 24 wreckfish, 16 bottom longline, 9 trap, and 2 troll trips. Unless otherwise specified, all length information was based on data from this sampling.

Offshore fish production (3.046 M pounds) continued to decline gradually (Fig. 15) with decreases evident for most species and gear categories. Pelagics (primarily swordfish, dolphin, and king mackerel) were the largest component (Fig. 16) by virtue of greatly increased landings of dolphin. Shark production increased 53%. Aggregate grouper landings increased slightly (3%), but catches of all other demersal groups declined. Wreckfish volume declined 29%, black sea bass dropped 27%, snappers (primarily vermilion) were down 23%, porgies (mostly red) were off 19%, and tilefishes (mainly golden) declined 11%.

Total ex-vessel value (\$5.085 M) also declined (9%) after adjustment for inflation. Pelagic species accounted for \$1.462 M and were the leading contributor. Grouper increased slightly to \$1.384 M, while other demersal categories posted declines.

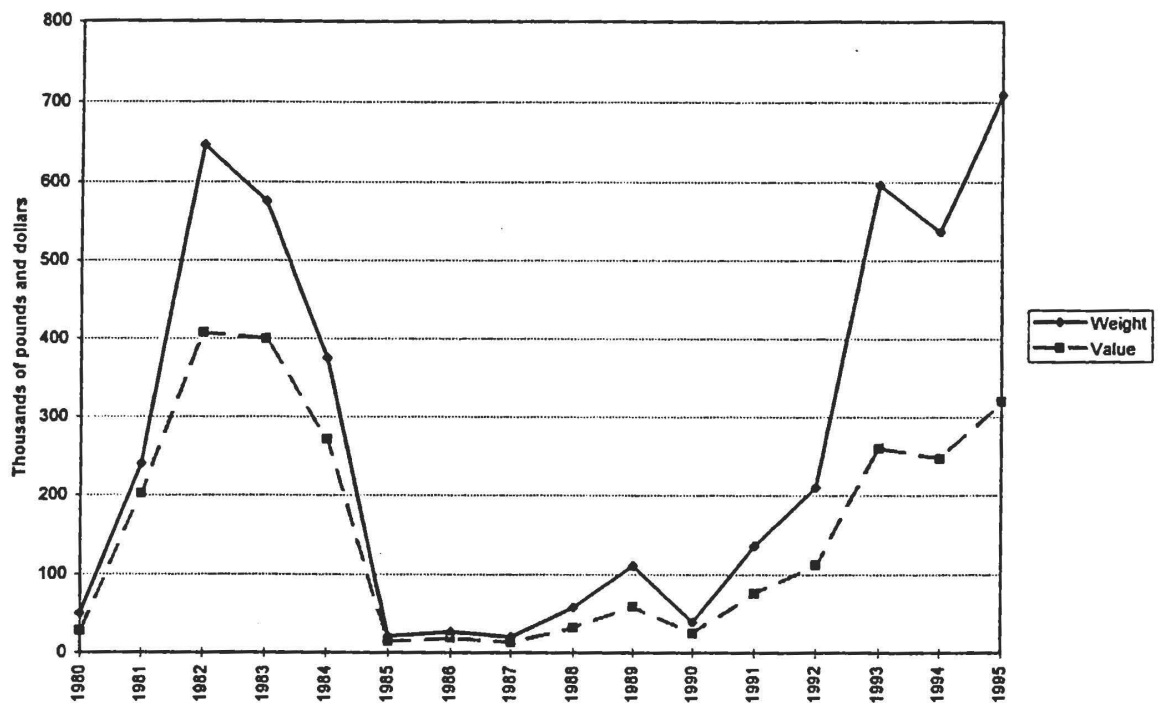


Fig. 14. Annual commercial landings and inflation-adjusted value of whelks.

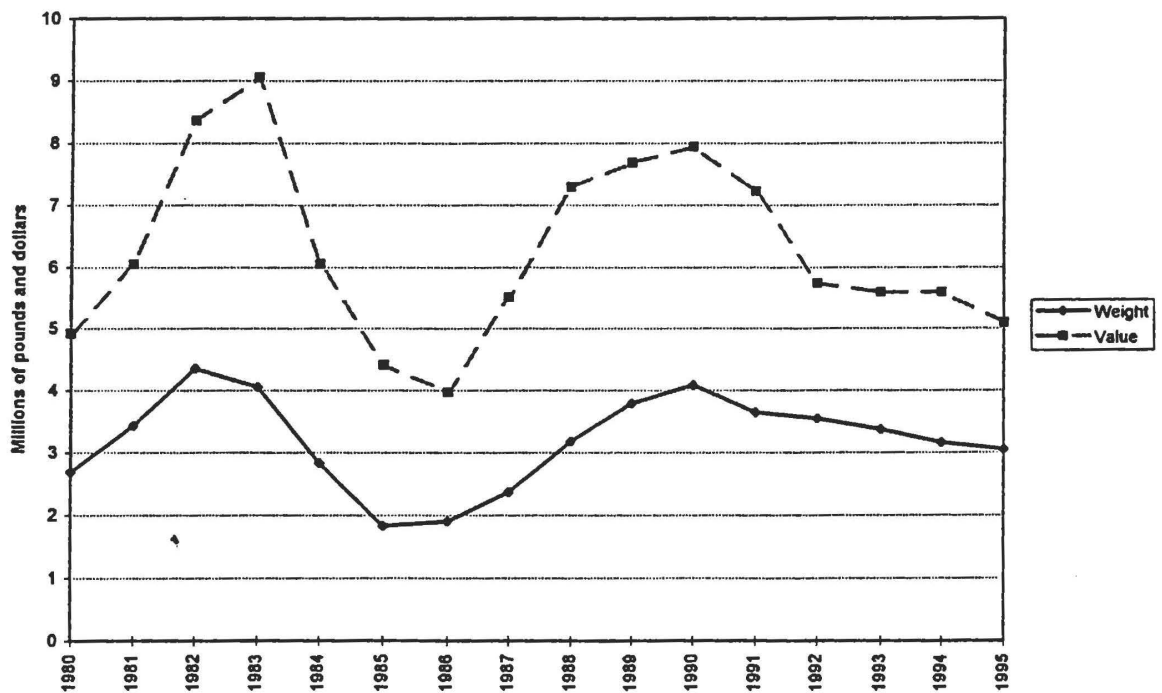


Fig. 15. Annual commercial landings and inflation-adjusted value of offshore fish.

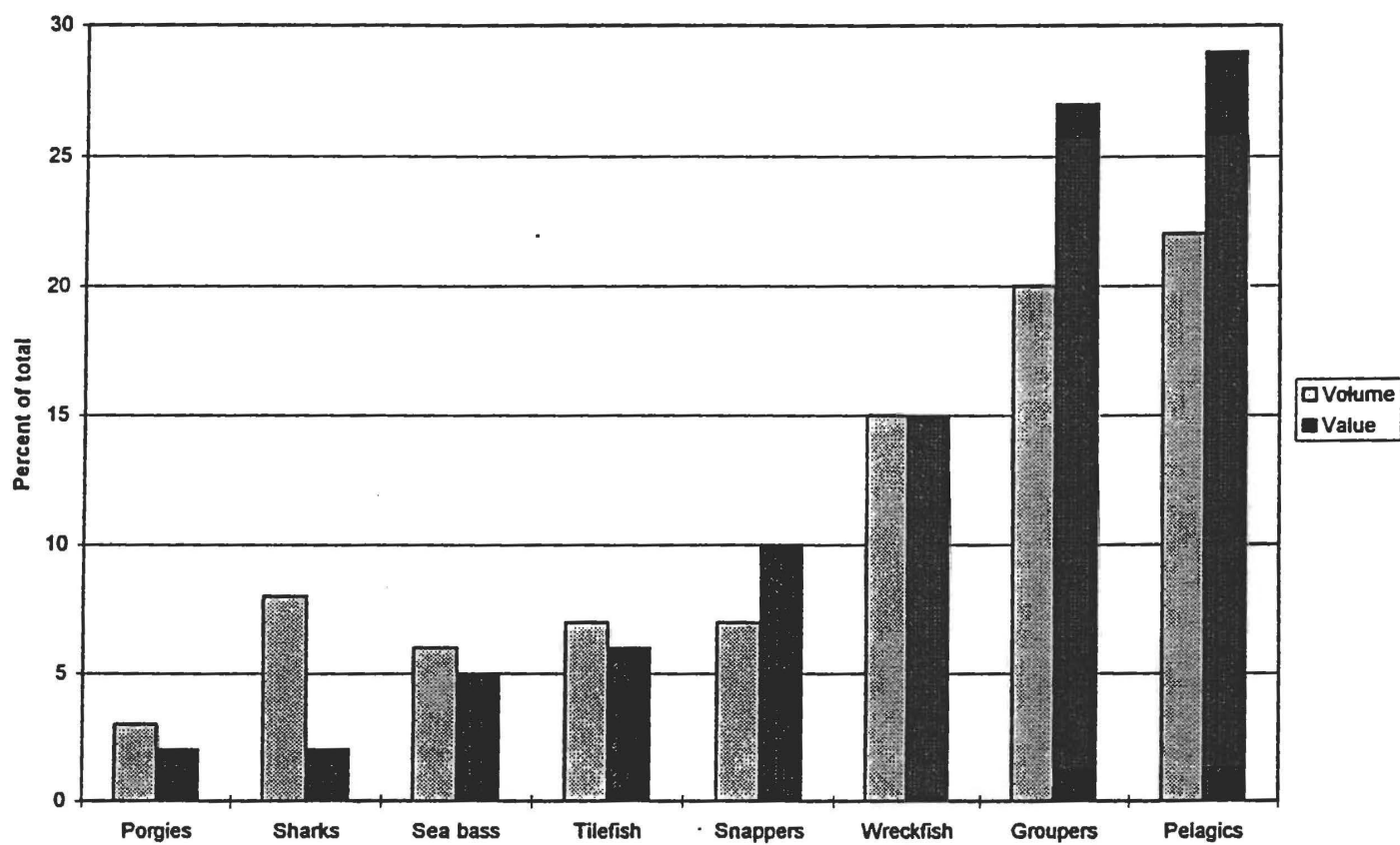


Fig. 16. Landings of major offshore fish groups.

The principal source of product was the handline fishery. This had two components, 1) a deepwater reel fishery for wreckfish and 2) a snapper reel fishery directed at reef species. Combined landings were 1.9 M pounds worth \$3.2 M.

Wreckfish landings (confidential) continued a downward trend with a 29% decrease from 1994's production. The 1995 catch was only 45% of that landed in the peak year, 1990. The fishery was closed during the January 15-April 15 spawning season. Five vessels reported 73 landings via the trip ticket system, compared to 85 (by eight boats) in the previous year. Average reported CPUE was 5,457 pounds/trip vs 6,688 in 1994. Length distribution (Fig. 17) remained similar to that in recent years with a slightly smaller average size (97.9 cm TL).

The snapper reel fishery historically has been the largest offshore fishery in terms of production and participation. Landings in 1995 (1.471 M pounds) remained nearly constant, although value (\$2.481 M) dropped slightly (Fig. 18). Most (81%) of the snapper reel catch consisted of reef species, the principal components being groupers (40%) and vermilion snapper (12%).

Ticket landings represented only 19% of the total reported snapper reel volume. Most of the major producers landed at docks not on the system. Because of these factors, CPUE calculated from the ticket data was not representative of the entire fleet and a reliable effort estimate could not be derived.

Total reef fish landings (1.594 M pounds) were worth \$2.707 M. Volume was the lowest since 1986. Groupers were the leading component (38%). Miscellaneous species, e.g. amberjacks, triggerfish, and grunts, accounted for 17%. Snappers and tilefish each contributed 14%, sea bass 11%, and porgies 6%. Relative composition was similar to that in the preceding three years.

Aggregate grouper landings were 608,000 pounds (\$1.384 M), up slightly from those in 1994. Landings of both gag (356,000 pounds) and scamp (147,000 pounds), the principal species, were above average, while snowy grouper landings (59,000 pounds) were the lowest on record. For the first time since 1981, snapper reel landings of snowies exceeded those by bottom longline.

Size distribution of groupers remained similar to that in recent years. Fig. 19 illustrates the contemporary length composition of gag landings compared to that prior to the build-up of the commercial fishery. The most obvious difference is the drastic reduction in percentage contribution of large (>90 cm) fish. Since these fish comprise the bulk of the male spawning stock, there has been growing concern about the possibility of recruitment overfishing if their percentage contribution (6.87% in 1995) continues to decline. The average size (76.2 cm), however, was the largest in five years (Fig. 20).

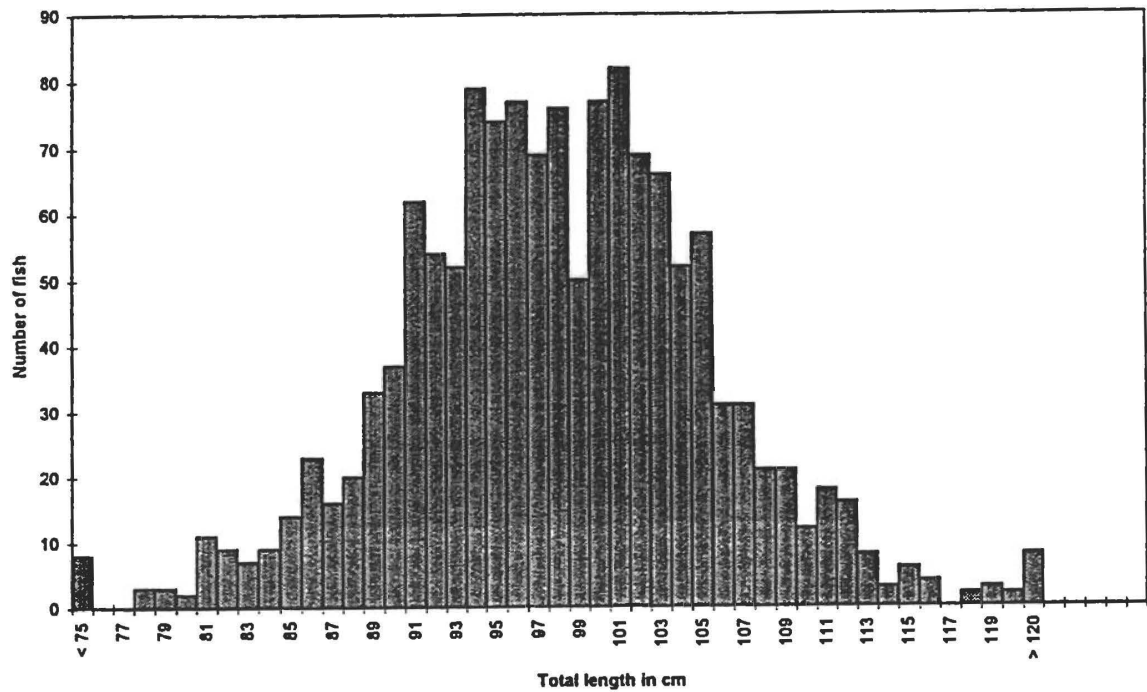


Fig. 17. Length distribution of wreckfish.

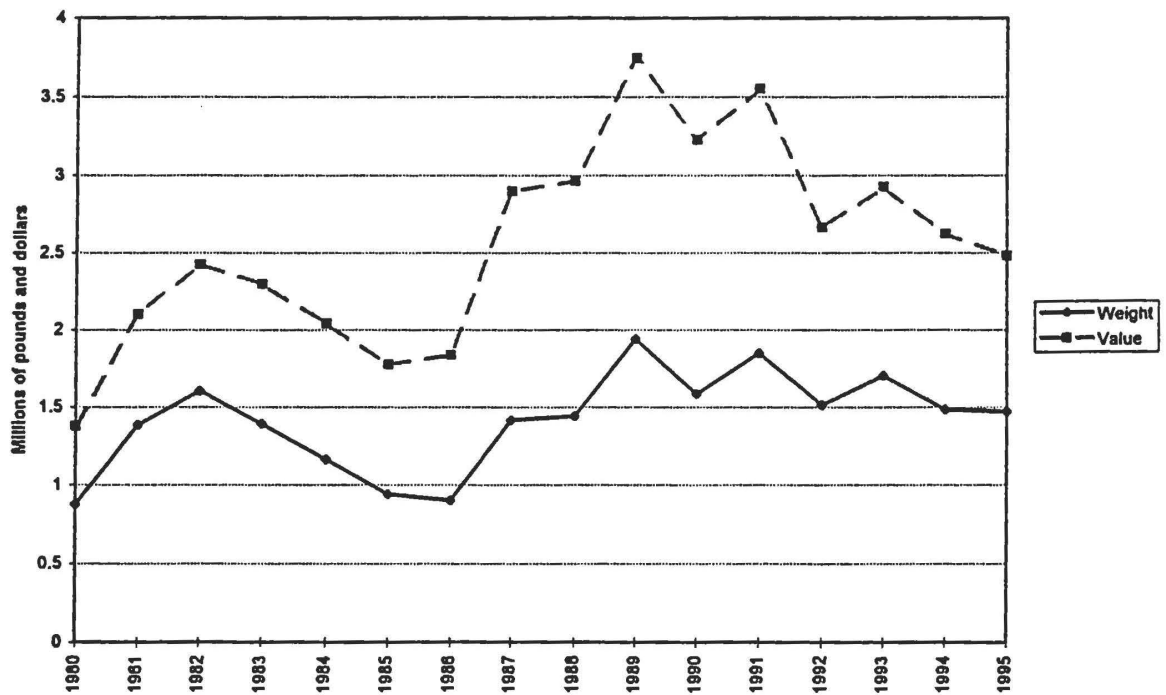


Fig. 18. Annual commercial landings and inflation-adjusted value of the snapper reel fishery.

Fig. 20. Average size of commercially landed gag.

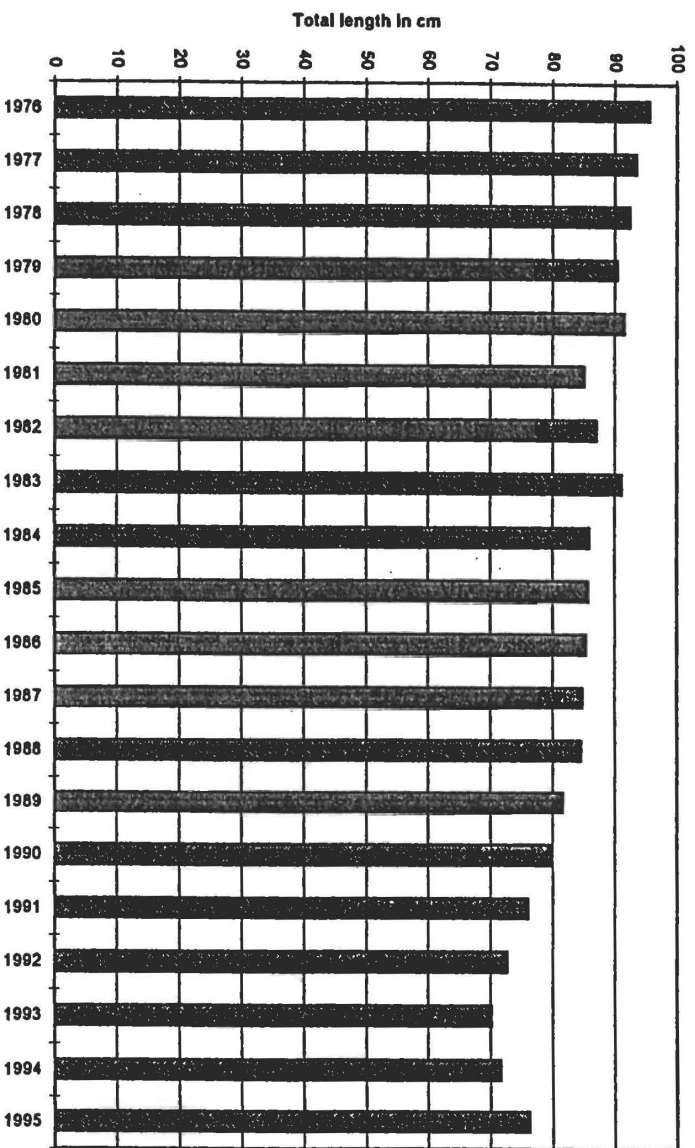
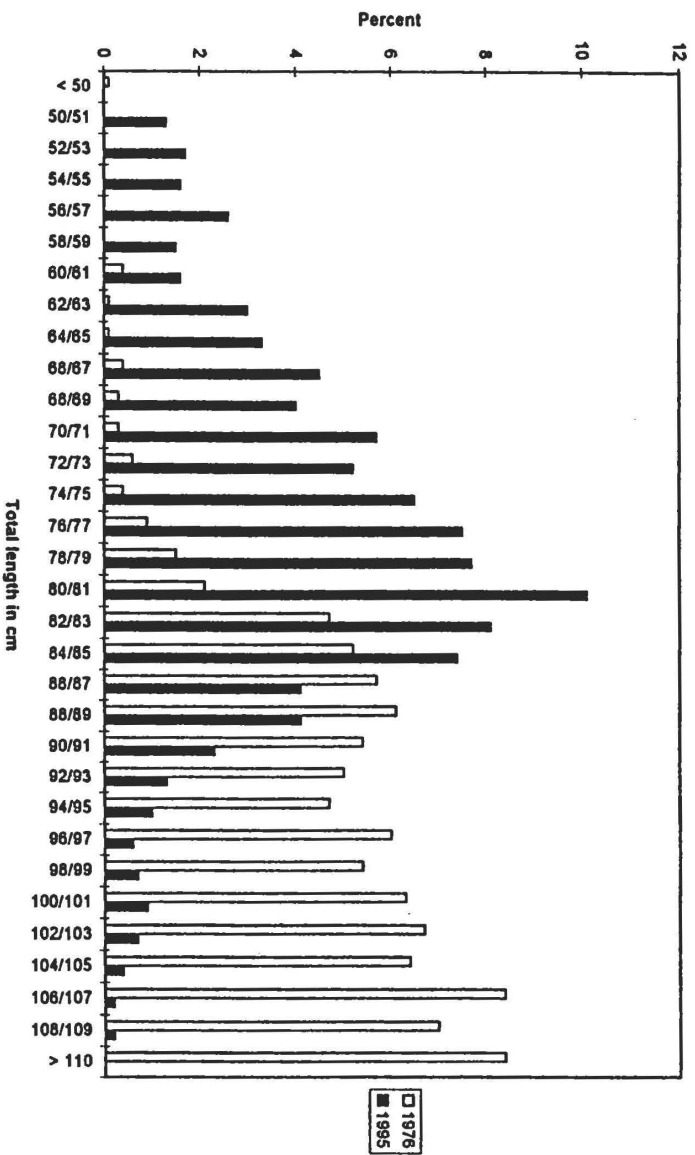


Fig. 19. Length distribution of commercially caught gag.



The situation is even more exaggerated for scamp. Current and historical length distributions are compared in Fig. 21. In recent years, maximum recruitment to the fishery has occurred in a size range very close to the minimum size limit (50 cm, 20 in) with few large fish present. The average size (53.3 cm FL in 1995) has been stable in recent years, but small by historical standards (Fig. 22).

There is no minimum size limit for snowy grouper, because of the low survival rate of this predominantly deepwater species when released. Present and historical length compositions are illustrated in Fig. 23. Again, there is a pronounced absence of larger fish in contemporary landings.

The long-term trend in average size is shown in Fig. 24 (the mean total length in 1995 was 52.4 cm) and to some extent reflects gear contribution. Prior to the late 1970's, there was little fishing in deep water (>70 fathoms) with most of the snowy catch taken incidentally. Most of the snowies in the shallower part of their depth range are relatively small fish.

As the (snapper reel) fishery targeted this species, it shifted to deeper water and caught larger fish after 1976. The longline fishery began in 1982 and operated in deep water. Initially, it also caught primarily large fish, but average size decreased in the mid-1980's as the deepwater resource became depleted. The relatively small average size in recent years reflects both this status and an increased contribution of snapper reel fish taken as incidental catch in shallow water.

Snapper landings continued a sharp decline with those of the principal species, vermilion (182,000 pounds), down 17% from the 1994 level. Historical landings are shown in Fig. 25 and the trend in average size in Fig. 26. Current length distribution is indicated in Fig. 27. The hook and line catch has always been dominated by smaller fish, but more so in recent years.

The sharply lower landings since 1991 reflect several factors. Prior to the imposition of a 30 cm (12 inch) minimum size for commercial landings in 1992, 49% of the commercial catch (in 1991) was <30 cm. The recreational minimum was set at 254 cm (10 in). The headboat catch has increased appreciably in recent years with much of it consisting of fish below the legal size for commercial harvest (see Headboat Fishery section). This competition may be reflected in the lower commercial landings.

By virtue of their glamorous reputation, red snappers attract attention disproportionate to their insignificant role in the fishery. Commercial landings have shown pronounced fluctuations (Fig. 28) that appear related to the presence of dominant year classes. Some of the decrease in 1992 appeared due to increasing the minimum size limit from 30 cm (12 in) to 50 cm (20 in) minimum

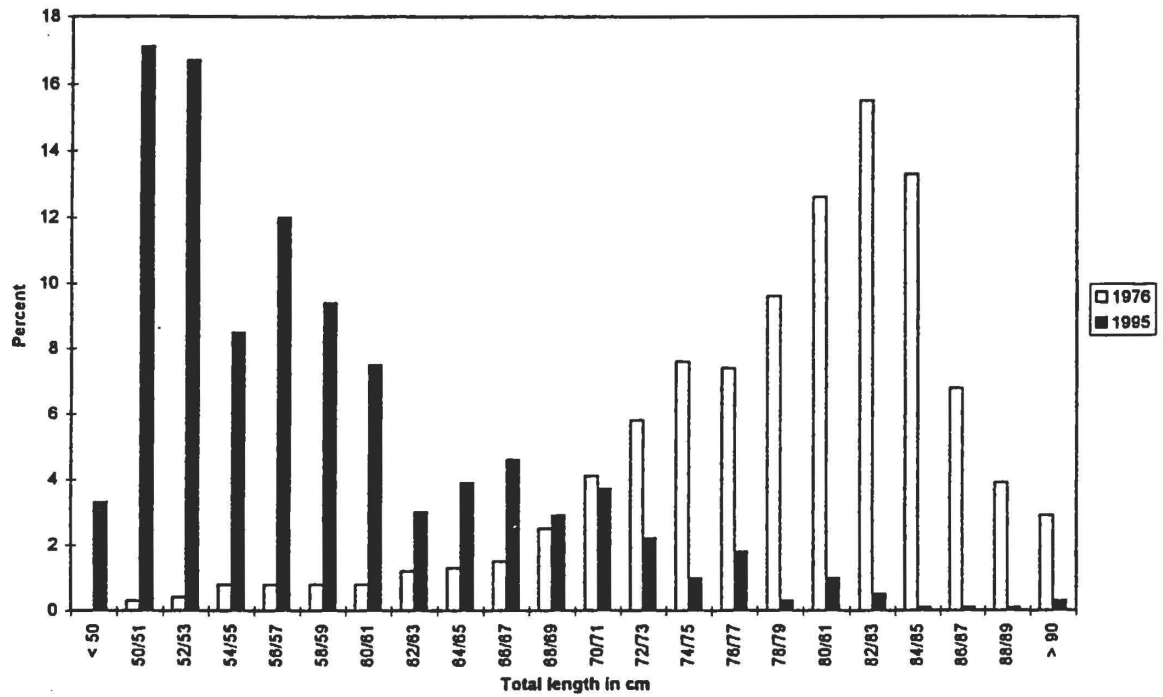


Fig. 21. Length distribution of commercially landed scamp.

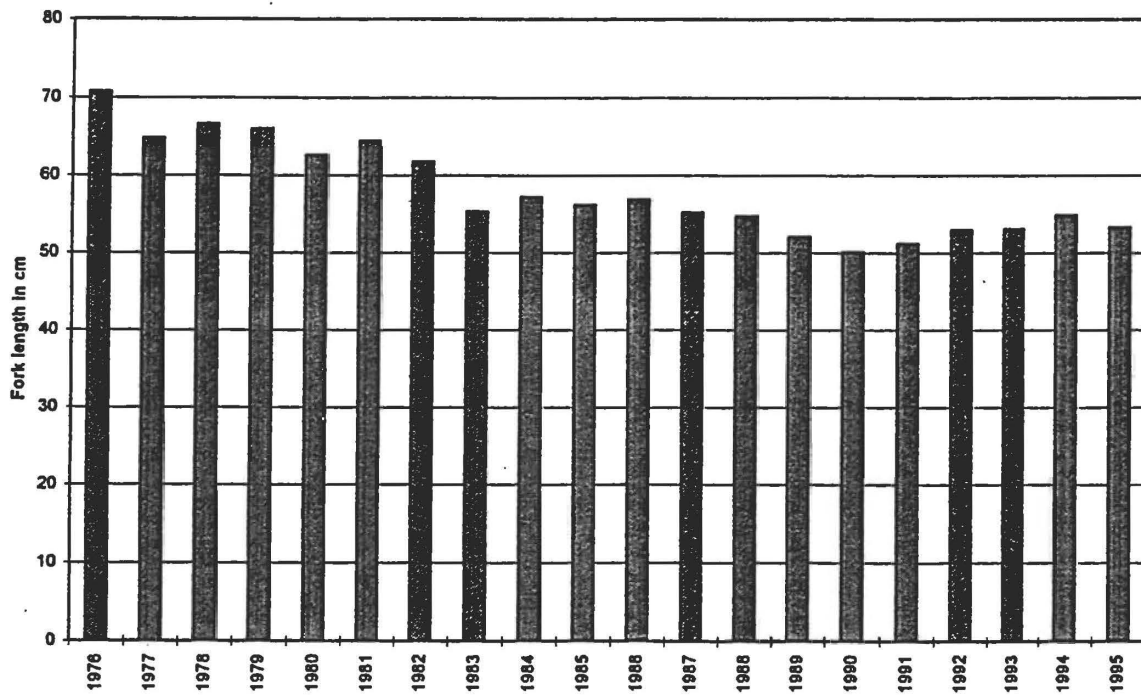


Fig. 22. Average length of commercially caught scamp.

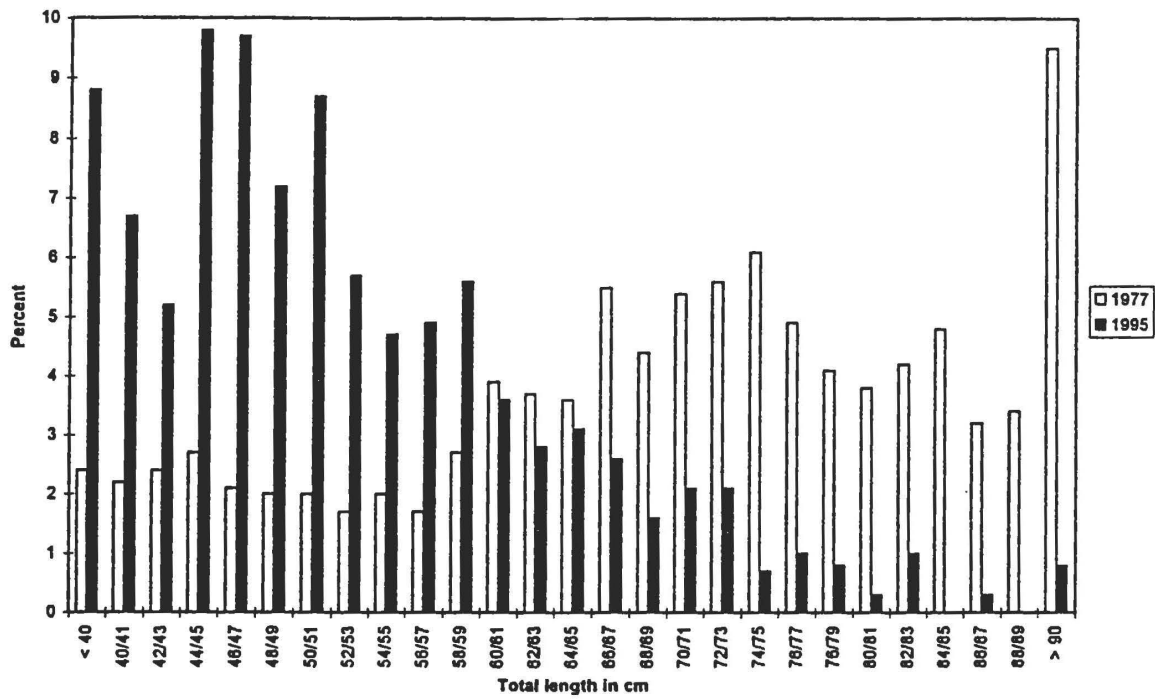


Fig. 23. Length distribution of commercially landed snowy grouper.

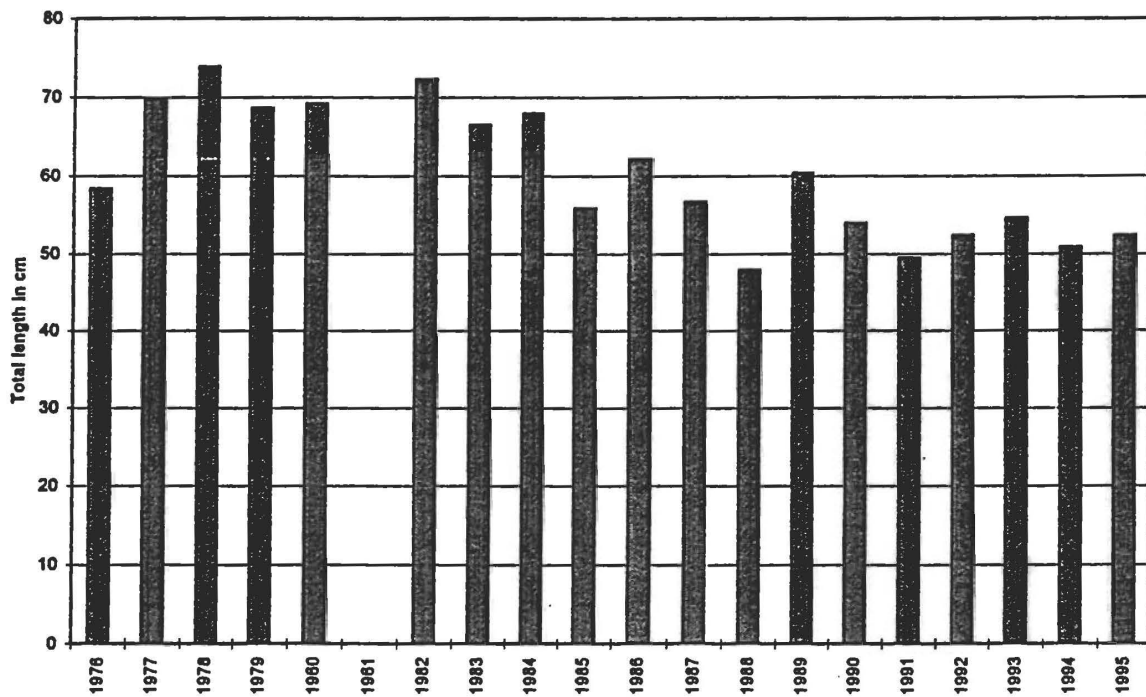


Fig. 24. Average length of commercially landed snowy grouper.

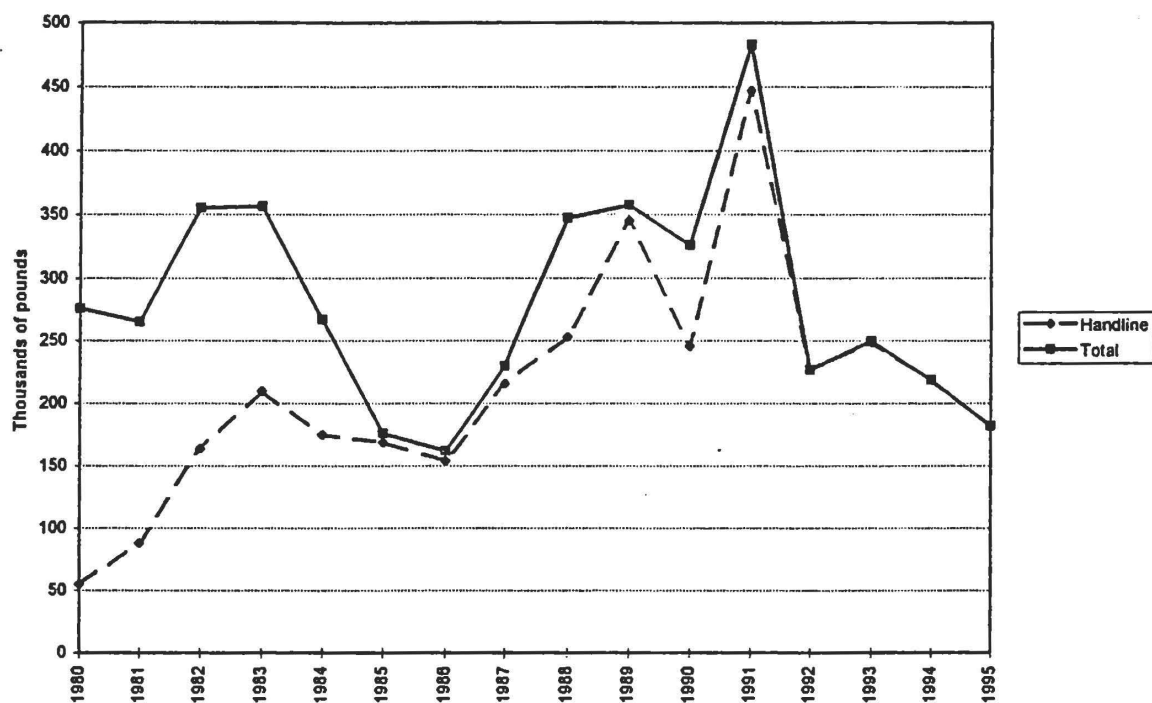


Fig. 25. Annual commercial landings of vermillion snapper.

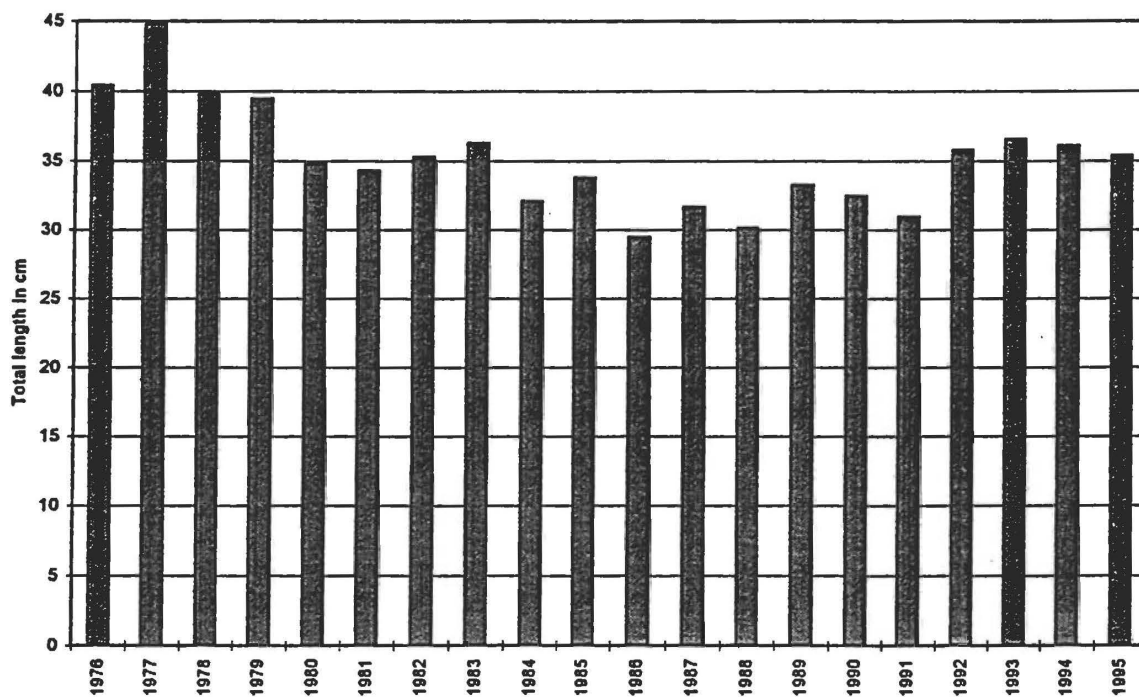


Fig. 26. Average length of commercially caught vermillion snapper.

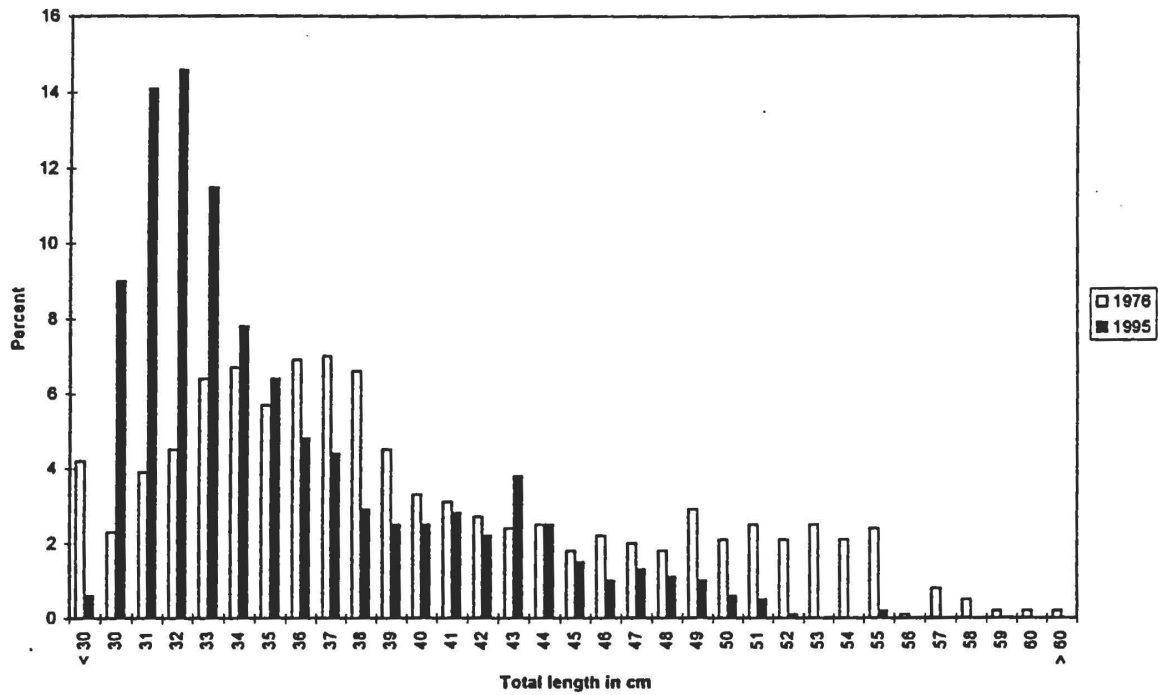


Fig. 27. Length distribution of vermilion snapper caught on snapper reels.

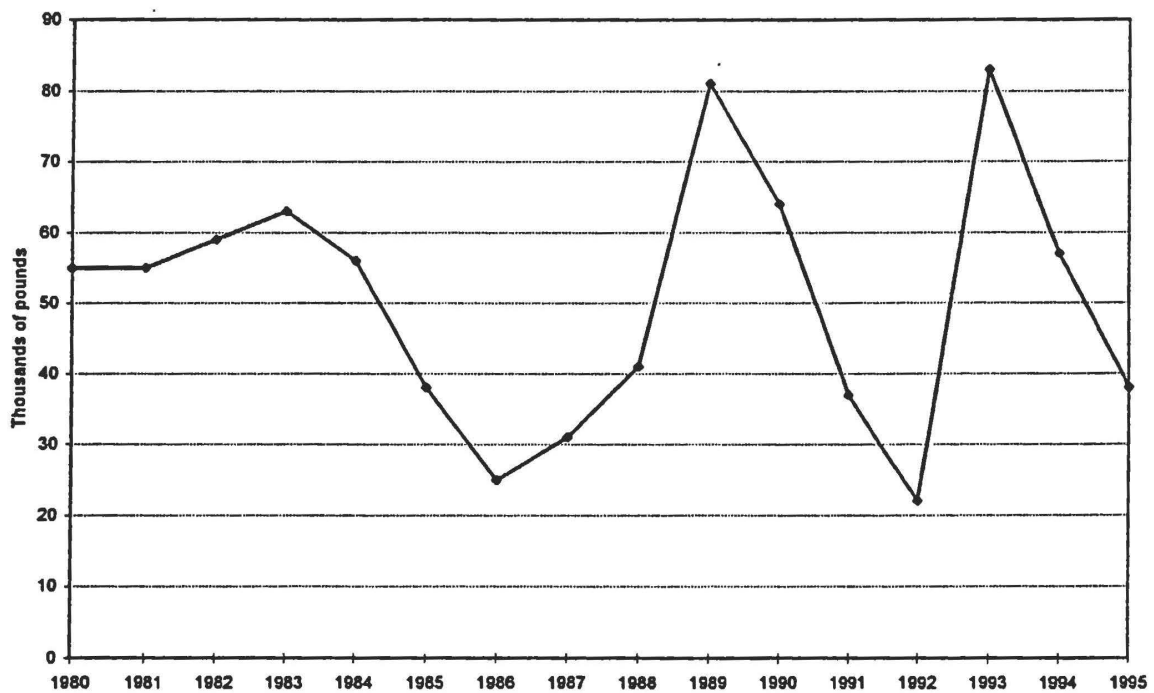


Fig. 28. Annual commercial landings of red snapper.

size limit.

Size distribution of red snapper is shown in Fig. 29. Annual length composition has been highly variable, depending on the presence of a strong year class. For example, the 1993 landings consisted largely of fish just over the minimum size limit, i.e., new recruitment. This cohort contributed to a much stronger showing of 55-60 cm fish in 1994 and has continued to influence an annual increase in average size (Fig. 30) since its entry. Landings, however, have declined due to the decreasing number of these fish remaining available to the fishery, nor are they likely to increase until the arrival of another strong year class.

Historically, red porgy was one of the largest components of the reef fish catch, contributing >25% until 1981. In 1995, the snapper reel catch was only 79,000 pounds, the lowest to date and only 21% of the peak landings in 1979 (Fig. 31). Length distribution is shown in Fig. 32 and the trend in average size in Fig. 33. The current size distribution strongly indicates substantial growth overfishing. A 30 cm (12 in) minimum size limit was implemented in 1992, but has had little corrective effect.

The trend in bottom longline production is shown in Fig. 34. Landings in 1995 were 452,000 pounds valued at \$405,000, near the bottom of the historical range. Only a few boats (producing mostly sharks) were on the ticket system in 1995, so no estimate of effort could be made.

This fishery initially targeted deepwater reef fish with golden tilefish the principal objective. Although found over both soft and rocky bottom, this species has been primarily fished over its mud habitat. Snowy grouper and blueline tilefish also have been taken over rocky substrate. After landings of these species, particularly golden tilefish, declined drastically in 1987, fishermen increased their effort for sharks. Since 1988, sharks have comprised a significant (sometimes majority) portion of the bottom longline landings.

Golden tilefish landings have recovered somewhat since the late 1980's, but the stock remains overexploited off South Carolina. The current size distribution (Fig. 35) is dramatically different from that in the first year of significant directed effort on the population inhabiting the mud bottom. At that time, 34% of the catch consisted of fish >90 cm, compared to 2% in 1995. Average size (Fig. 36) declined almost constantly since the onset of the directed fishery until 1993, after which it has edged upward. In 1995, it was 58.5 cm TL.

For most of the last ten years, the bottom longline fishery has accounted for most of the commercial shark landings, particularly with the legislated phase-out of the inshore gill net

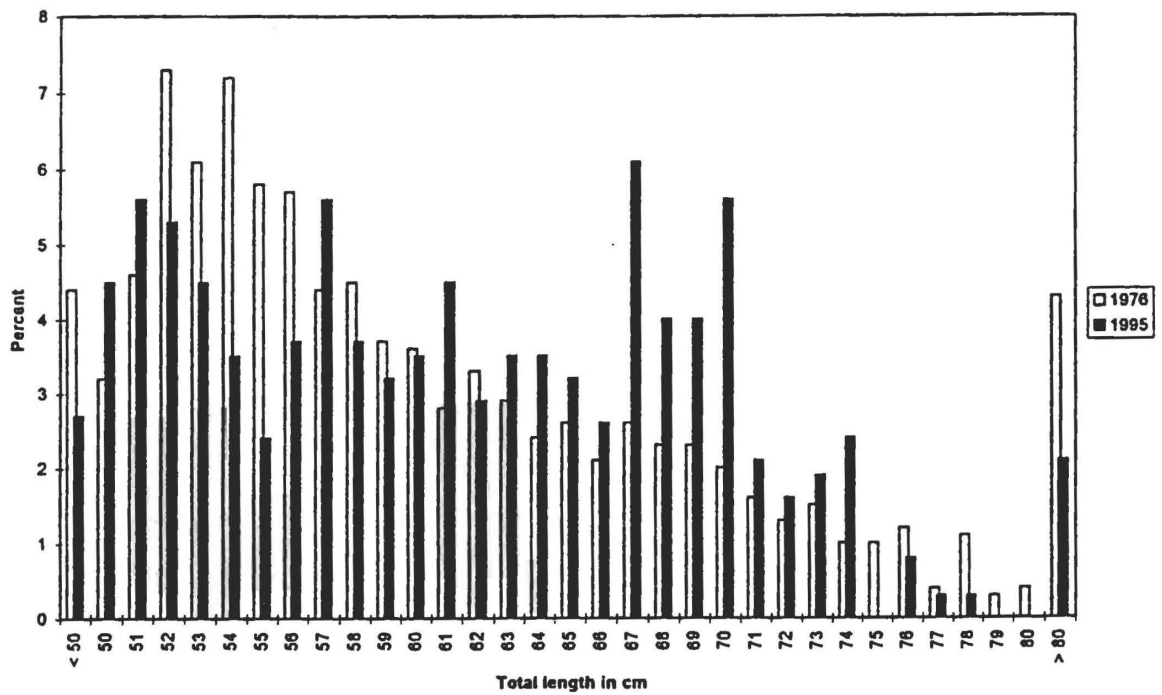


Fig. 29. Length distribution of commercially landed red snapper.

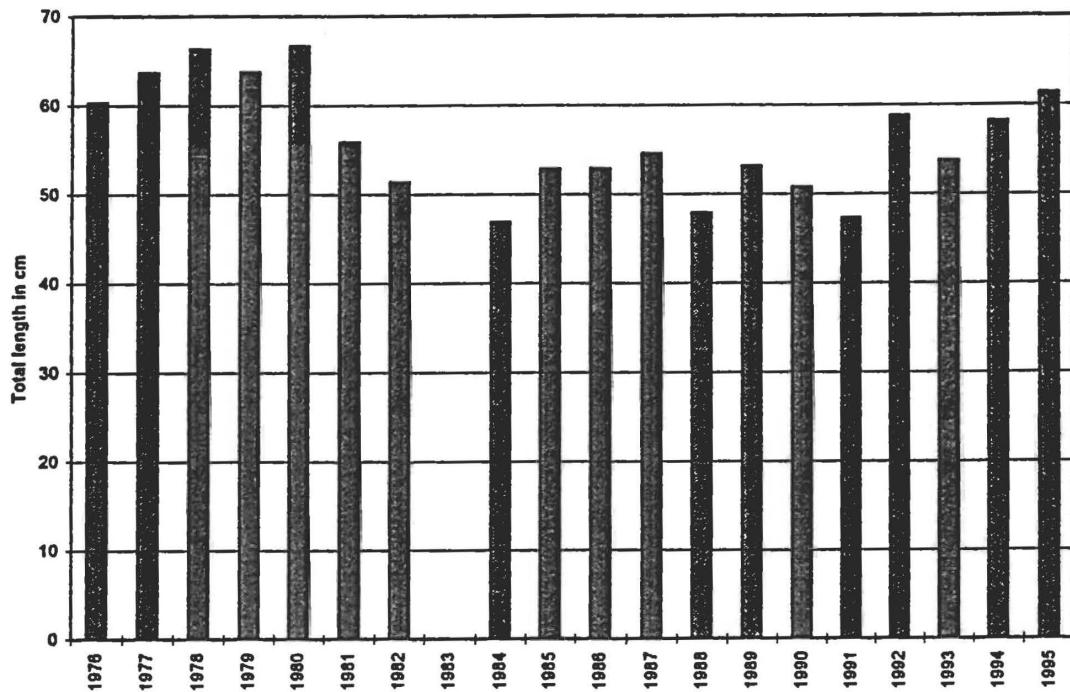


Fig. 30. Average length of red snapper caught on snapper reels.

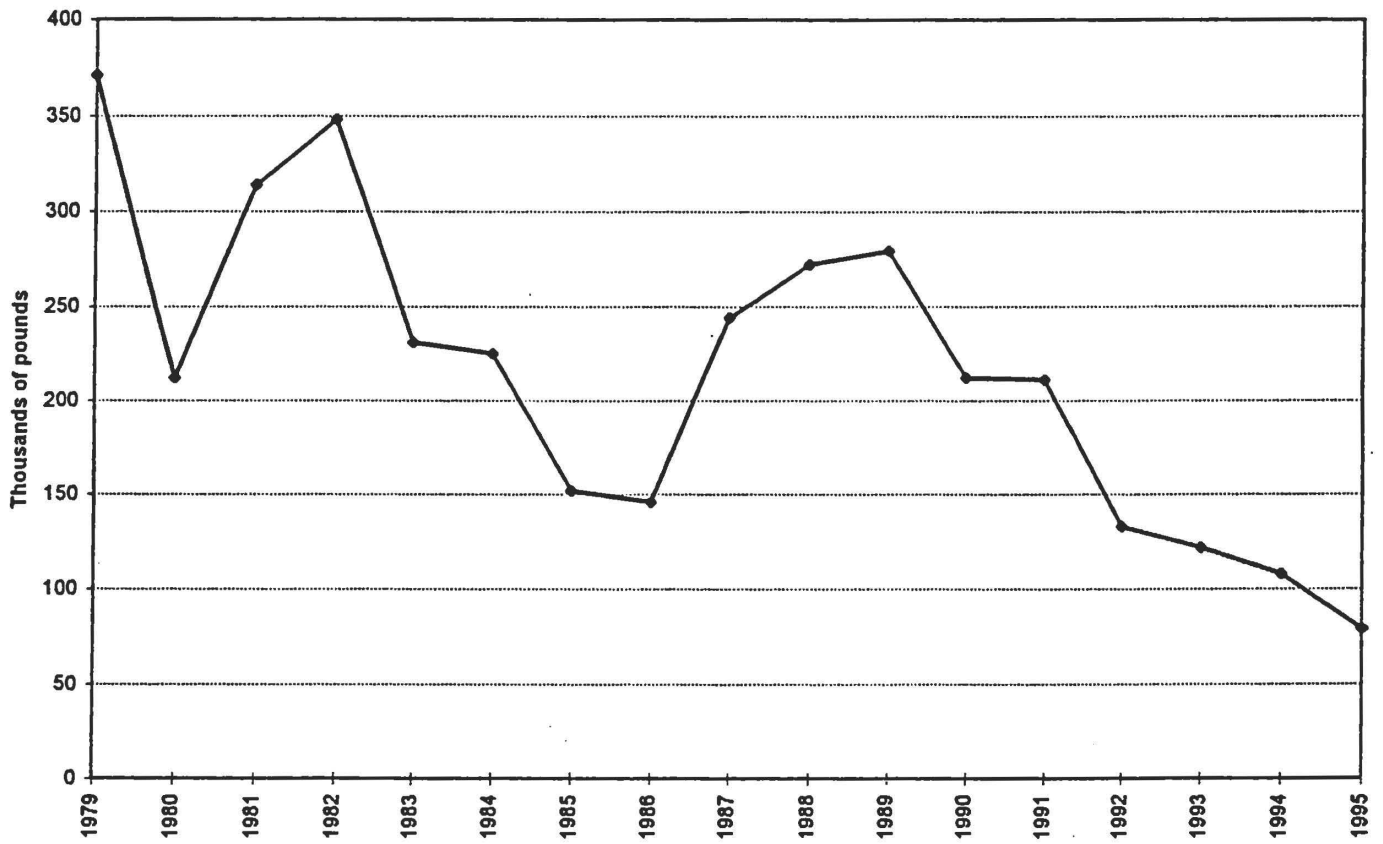


Fig. 31. Annual snapper reel landings of red porgy.

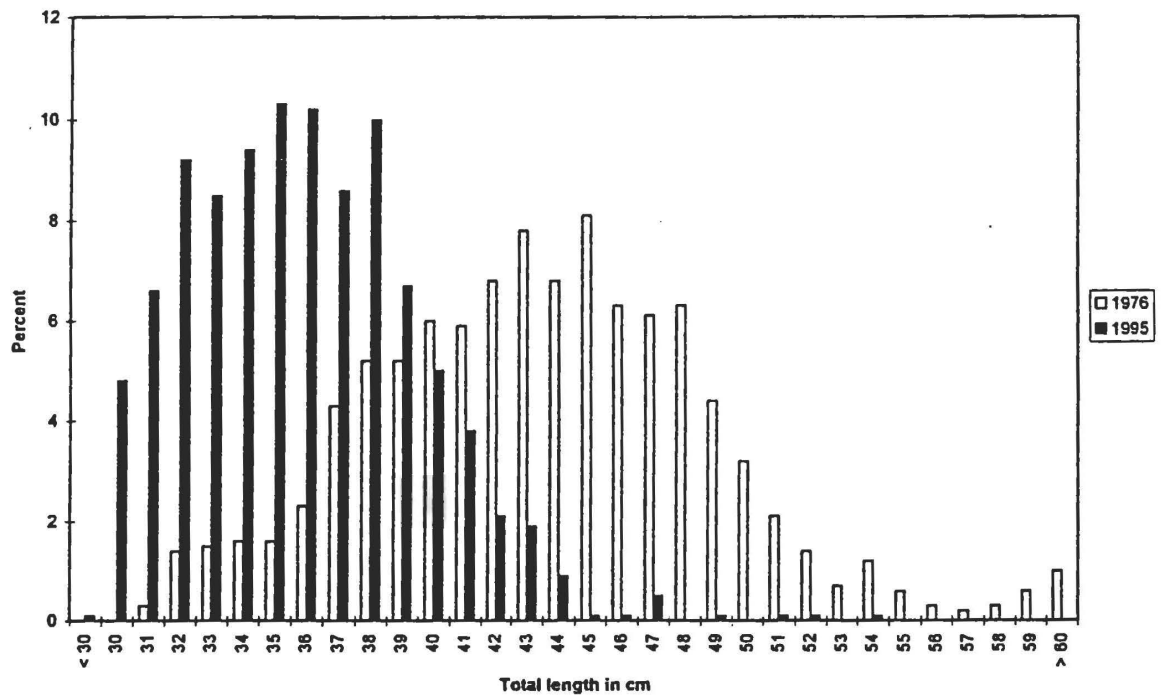


Fig. 32. Length distribution of red porgy caught on snapper reels.

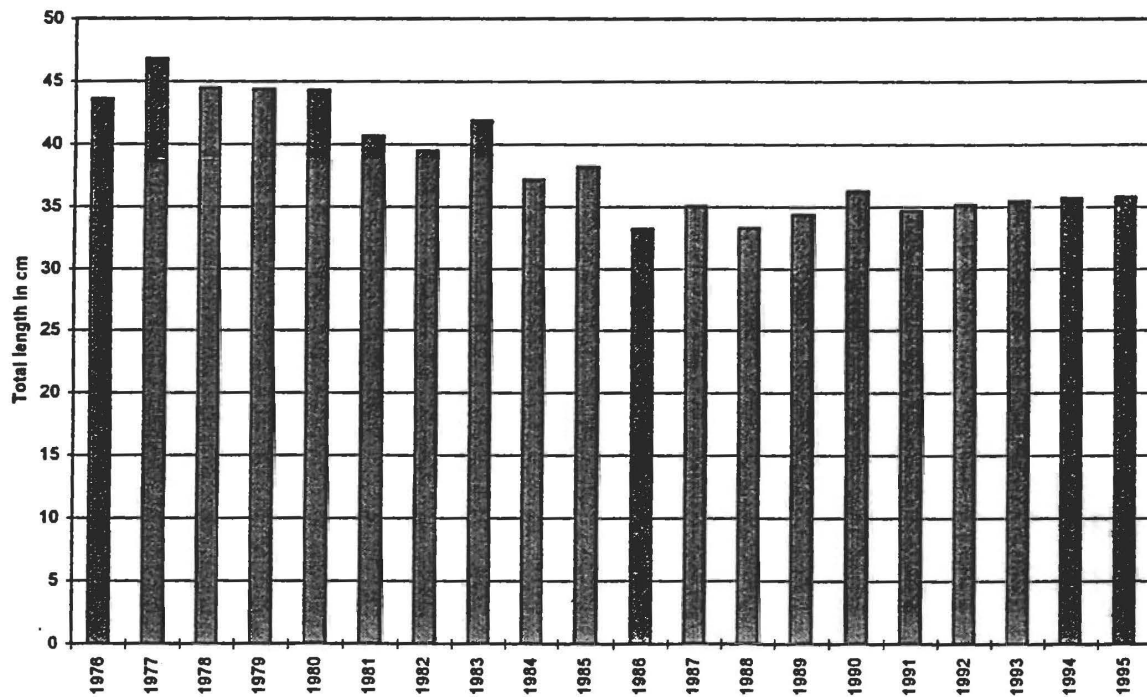


Fig. 33. Average length of red porgy caught on snapper reels.

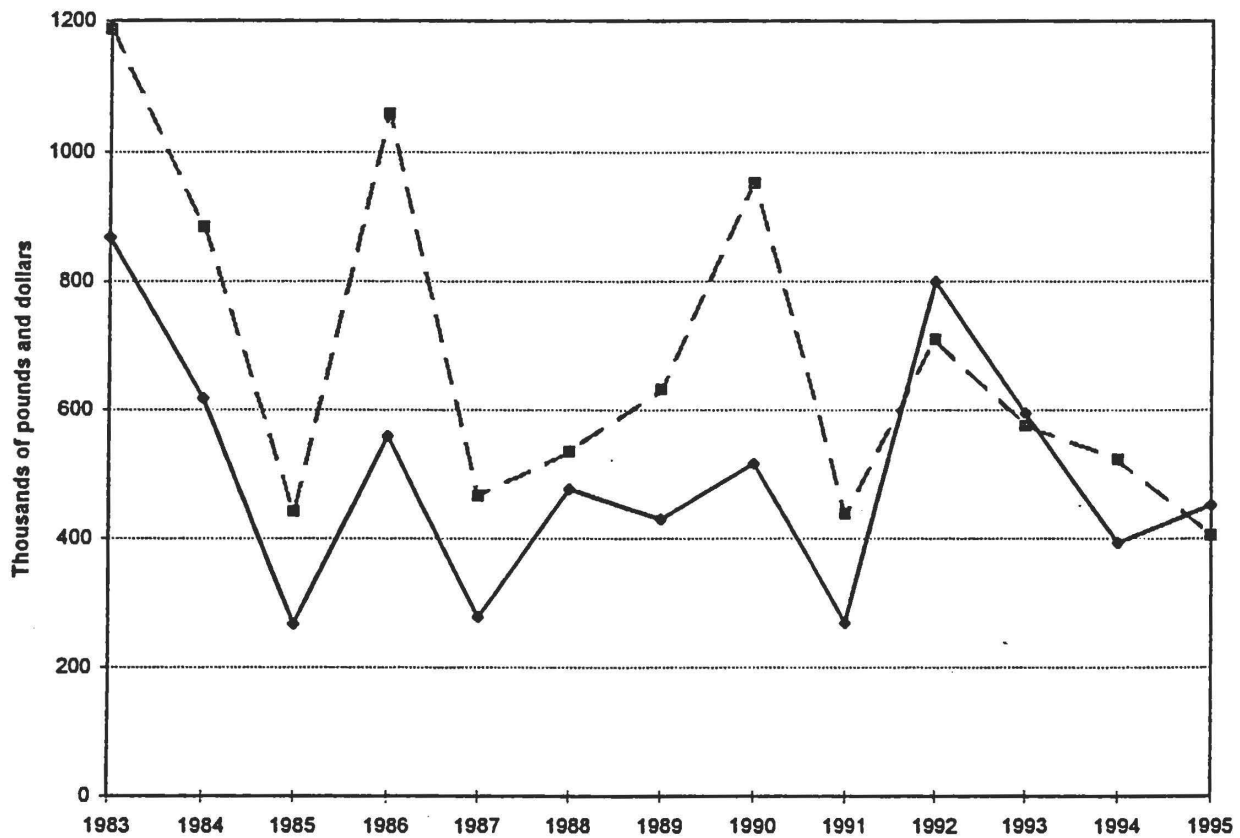


Fig. 34. Annual landings and inflation-adjusted value of the bottom longline fishery.

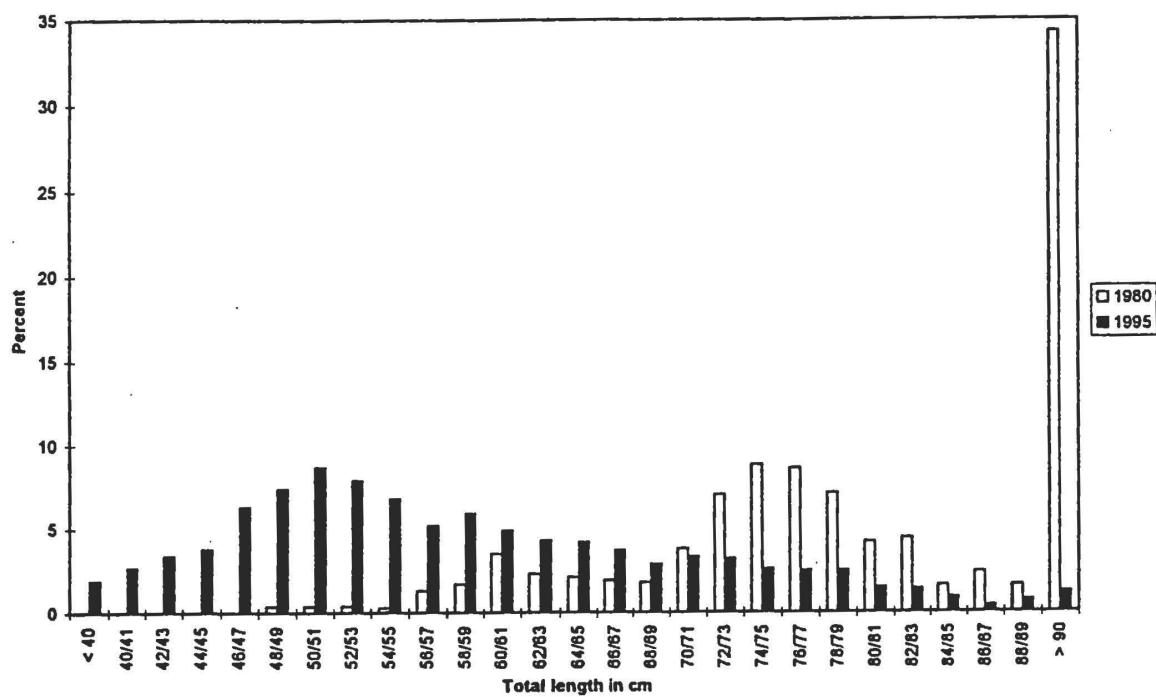


Fig. 35. Length distribution of golden tilefish.

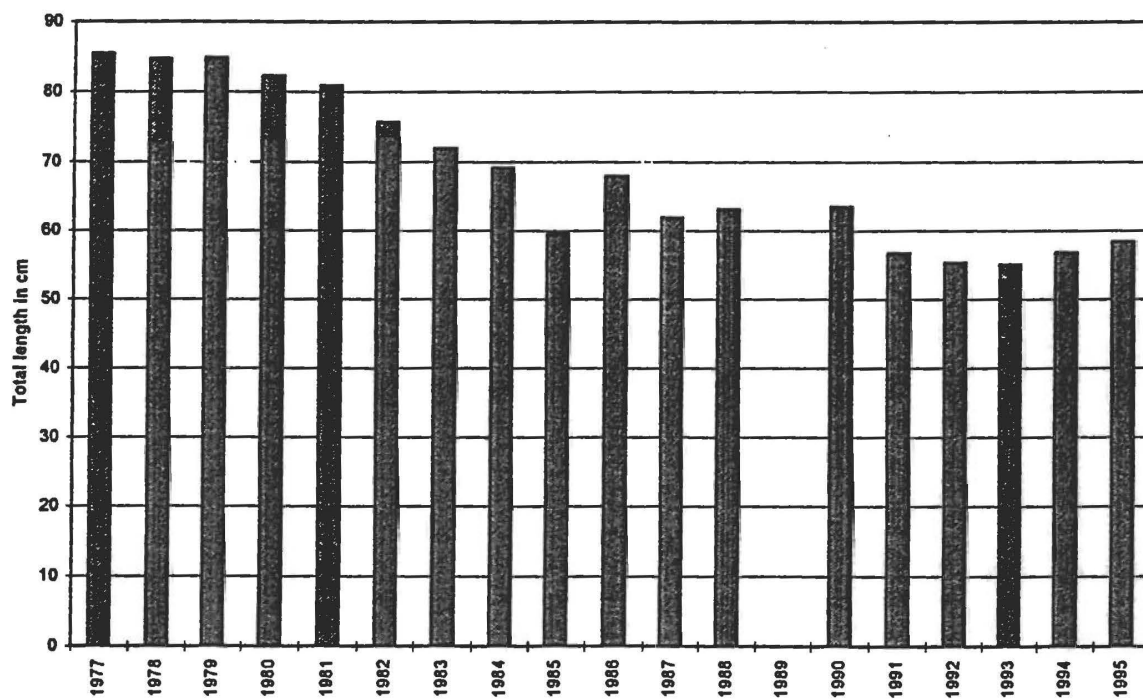


Fig. 36. Average length of golden tilefish.

fishery (Fig. 37). In 1995, inshore landings (entirely from shrimp trawlers) were only 16,000 pounds worth \$7,000. The offshore catch was 250,000 pounds valued at \$94,000. The NMFS closed the commercial fishery for the large coastal group during June and again in October through December under quota management.

Pelagic landings were composed of king mackerel, swordfish, dolphin, wahoo, and tunas (mostly yellowfin). King mackerel landings were 83,000 pounds (\$125,000), the lowest since 1986 (Fig. 38). Ninety percent was attributable to snapper reel boats. Length distribution is shown in Fig. 39 and the trend in annual average size in Fig. 40. Average length in 1995 was 84.6 cm FL.

Most of the landings of other pelagic species were attributable to the pelagic (surface) longline fishery. Since no boats were on the ticket system, no effort estimate is available from MRD data. Landings of dolphin (223,000 pounds) were exceptional, in part due to unusual abundance, but also reflecting more directed effort for this species inshore of the swordfish grounds. Total pelagic longline volume was 533,000 pounds worth \$1.23 M (Fig. 41).

The offshore trap fishery was directed at black sea bass (86% of the total volume). Total landings were 142,000 pounds valued at \$194,000, near the bottom of the historical range (Fig. 42). In 1990-1991, significant amounts of other reef species were also landed prior to regulatory changes designed to reduce catches of species other than black sea bass. Total trap effort could not be reliably estimated, due to limited ticket data.

The average catch rate of black sea bass was below average (1980-1994 = 844 pounds/trip) at 615 pounds per trip (Fig. 43). Length distribution of trap landings is shown in Fig. 44. The contribution of small (<0.75 pound) fish to graded trap landings was 46%, nearly the same as the 1980-1994 average (47%). The catch of black sea bass by all gears was 174,000 pounds valued at \$247,000, the lowest volume since 1985 and about 63% of the 1980-1994 average production.

COASTAL FISH

Most of the species in this category have low unit value and landings (especially of spot and mullet) have sometimes been influenced by current market demand. Total landings were 456,000 pounds worth \$174,000, relatively low by historical standards and reversing a 3-year upward trend (Fig. 45). Except for kingfishes (whiting), all major species posted declines: kingfish landings were the highest since 1987. Since imposition of a 30 cm (12 in) minimum size limit and TED requirements in 1990, flounder landings have been minimal.

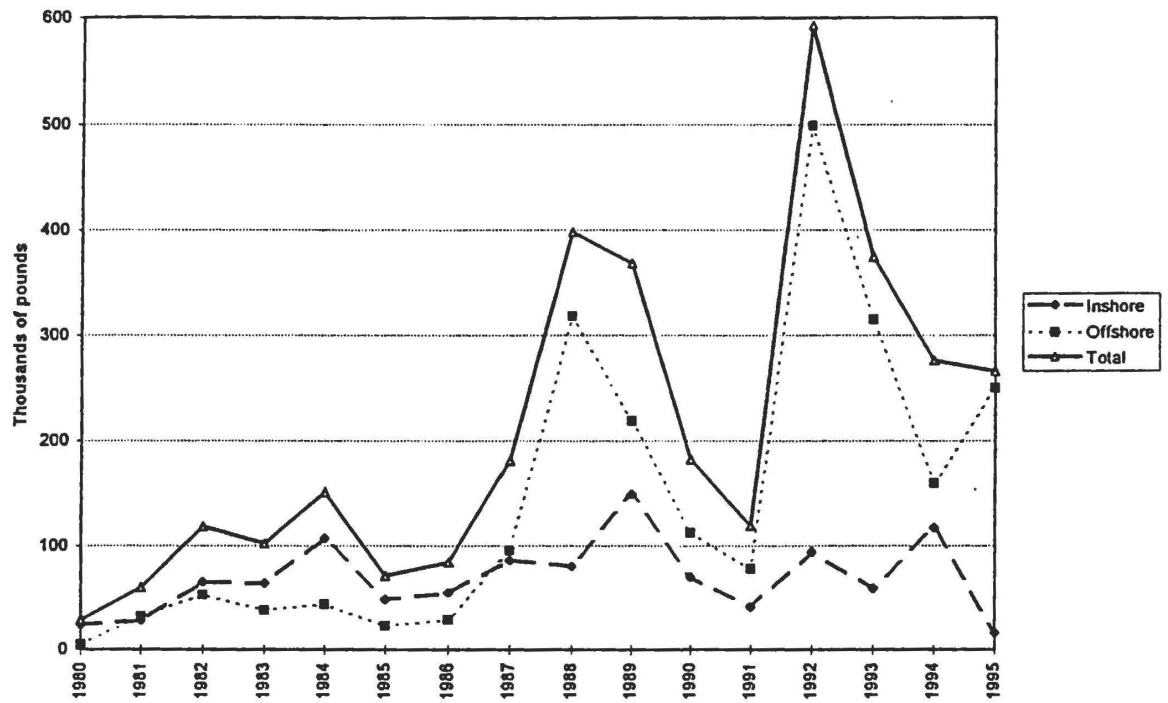


Fig. 37. Annual commercial landings of sharks.

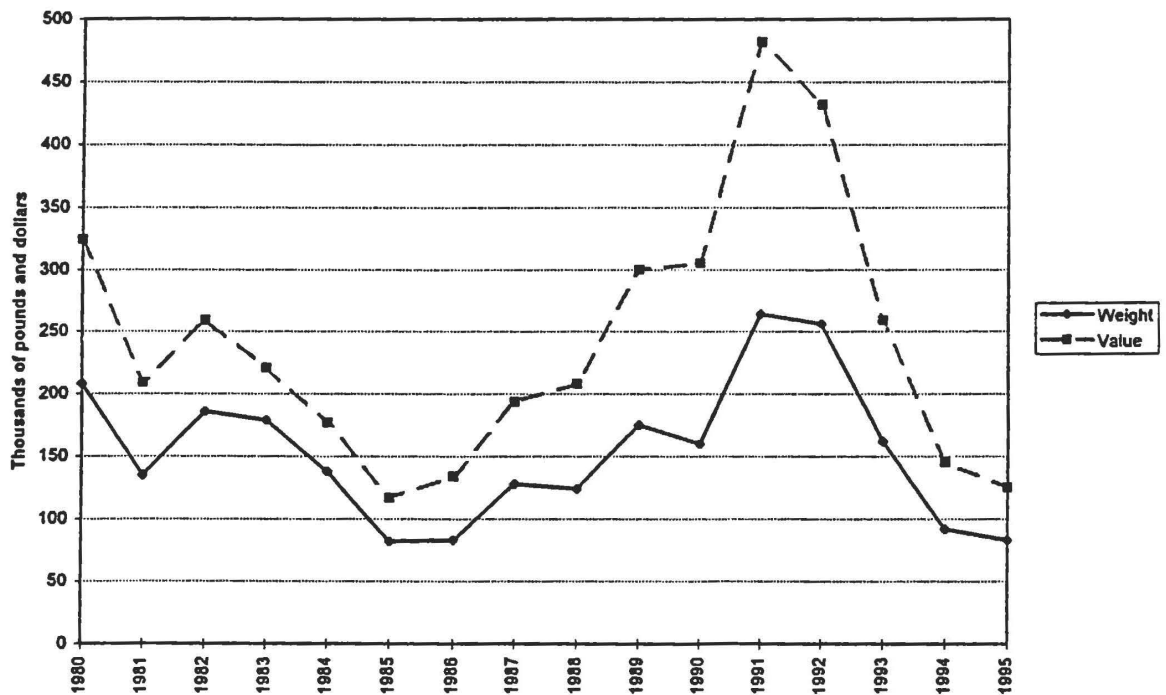


Fig. 38. Annual commercial landings of king mackerel.

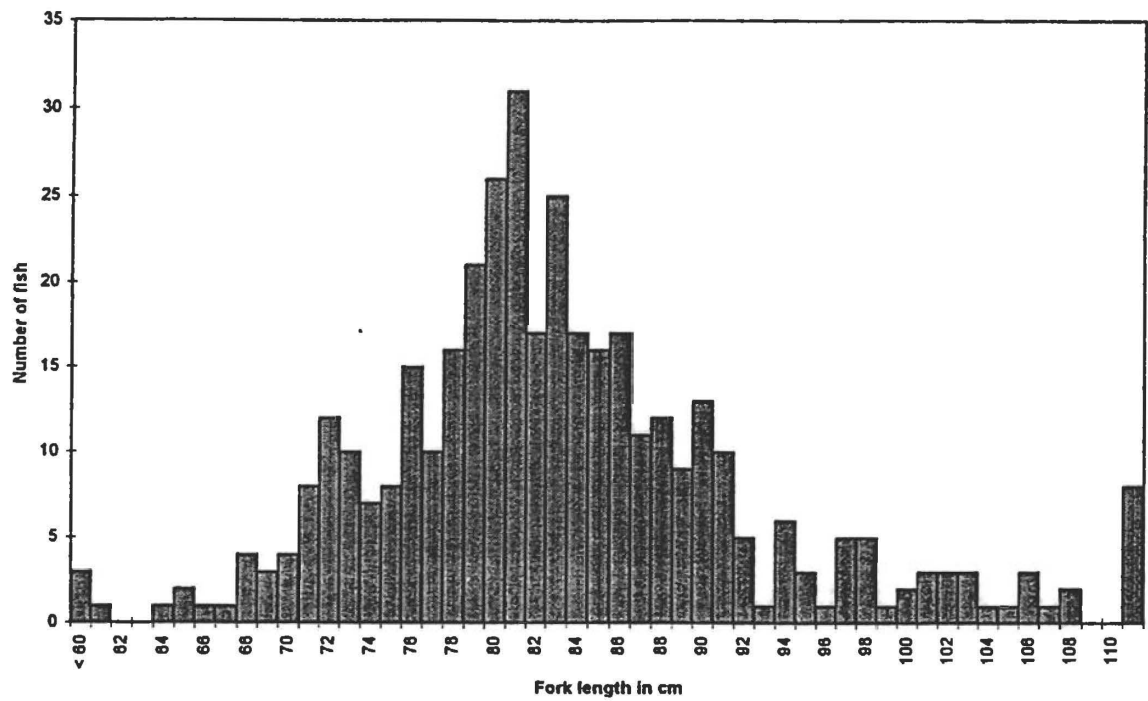


Fig. 39. Length distribution of commercially landed king mackerel.

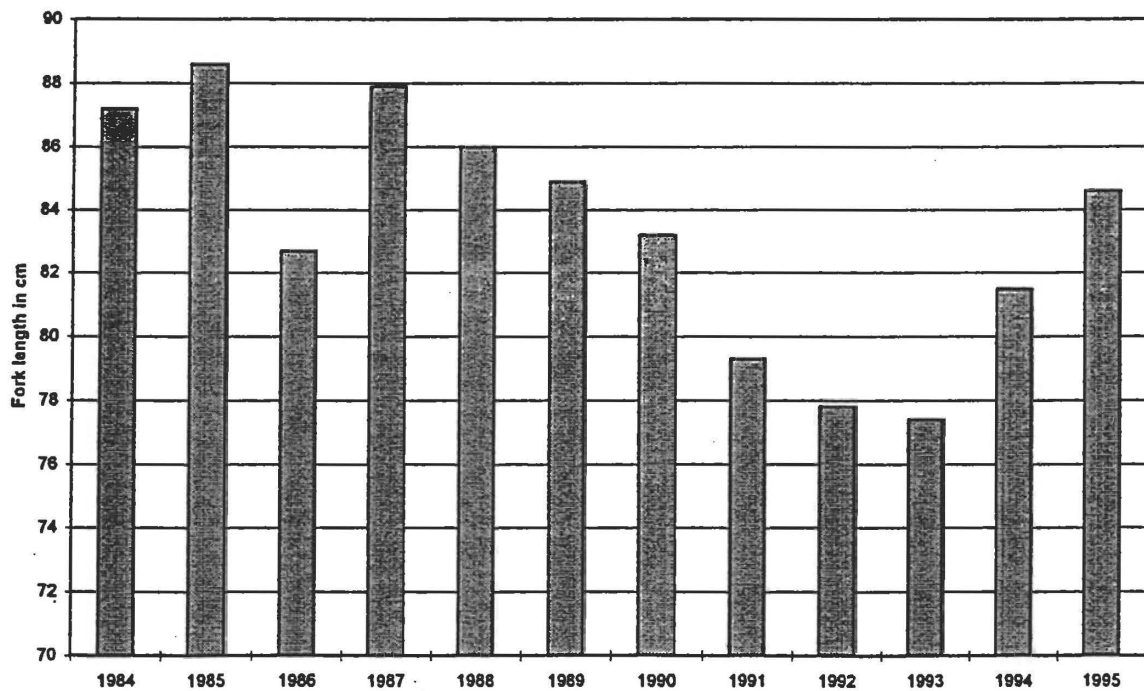


Fig. 40. Average length of commercially landed king mackerel.

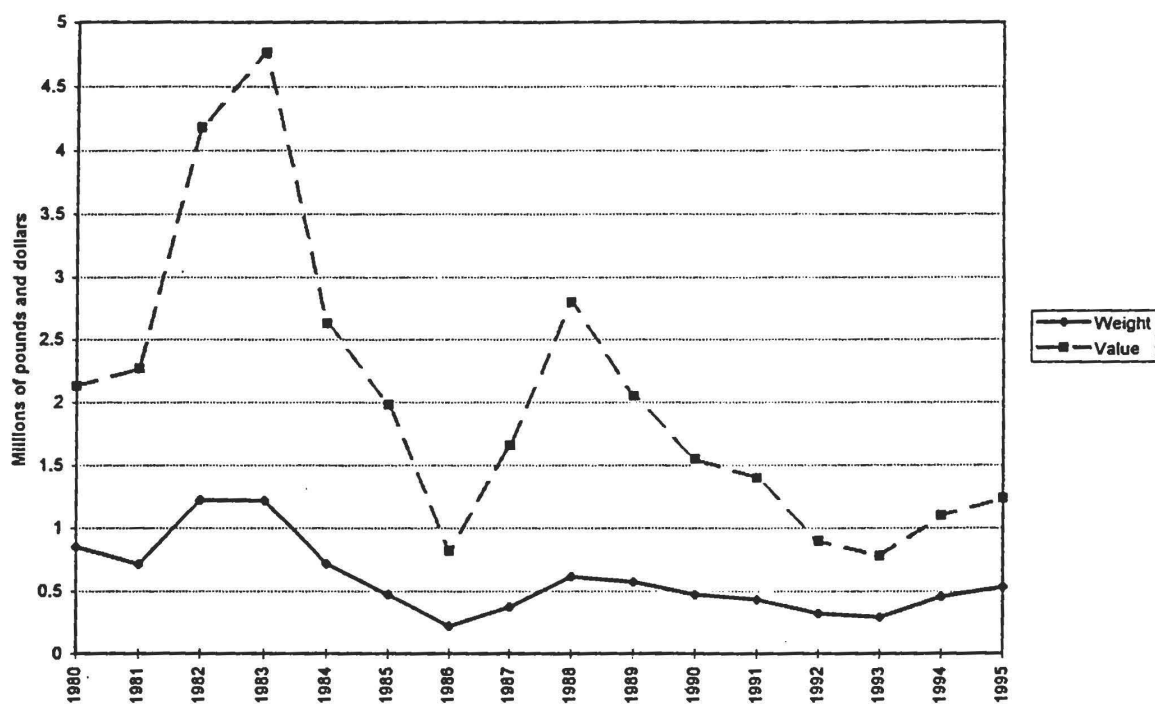


Fig. 41. Annual landings and inflation-adjusted value of the pelagic longline fishery.

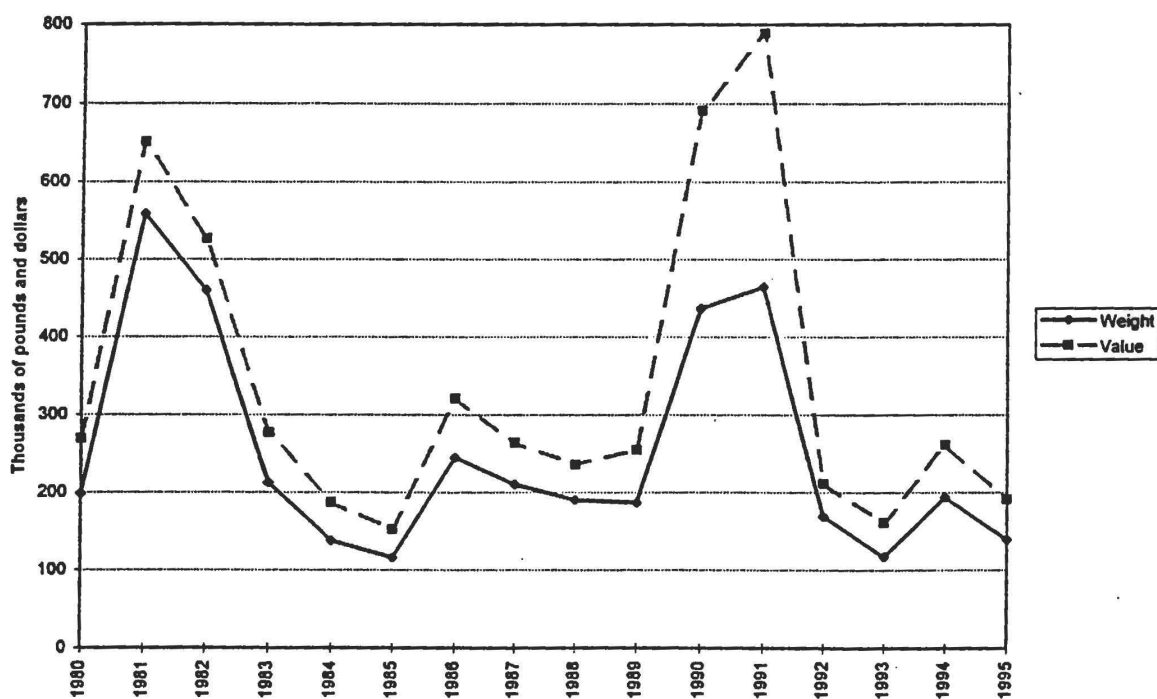


Fig. 42. Annual landings and inflation-adjusted value of the trap fishery.

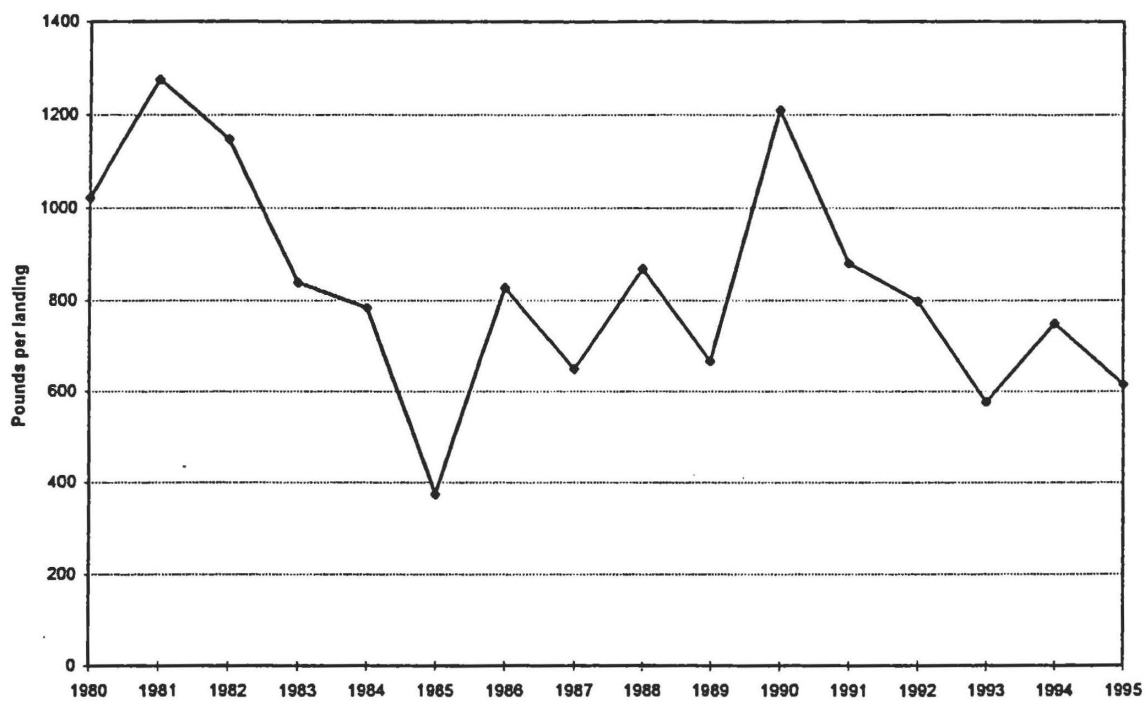


Fig. 43. Average catch/trip of black sea bass by trap boats.

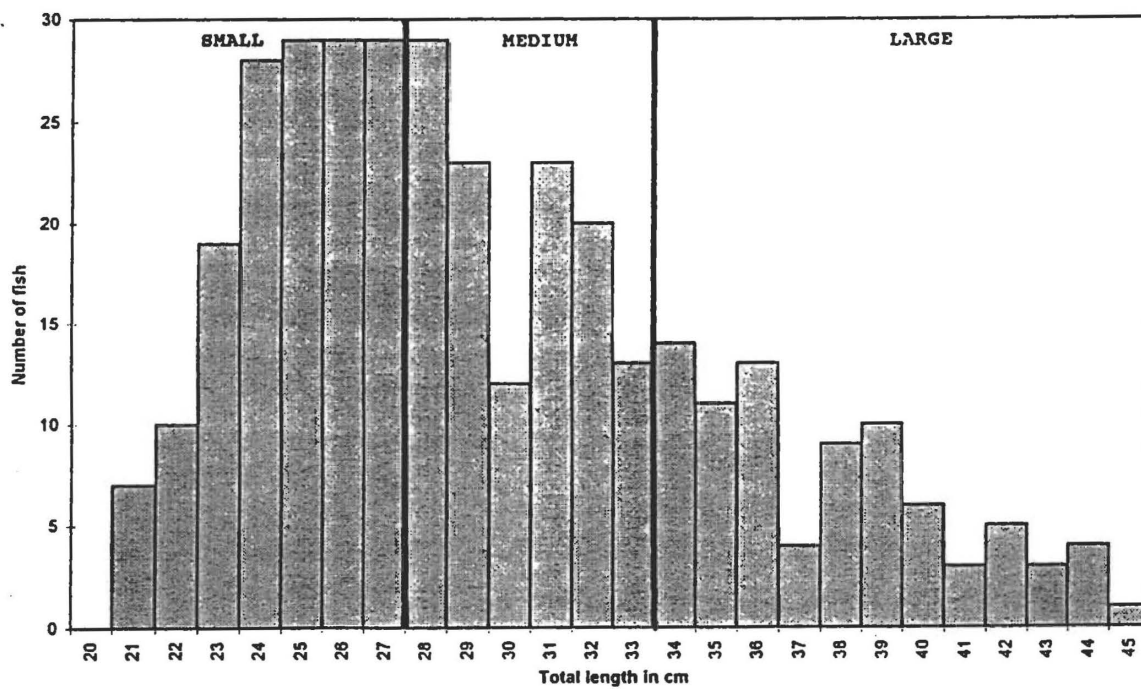


Fig. 44. Length distribution of trap-caught black sea bass.

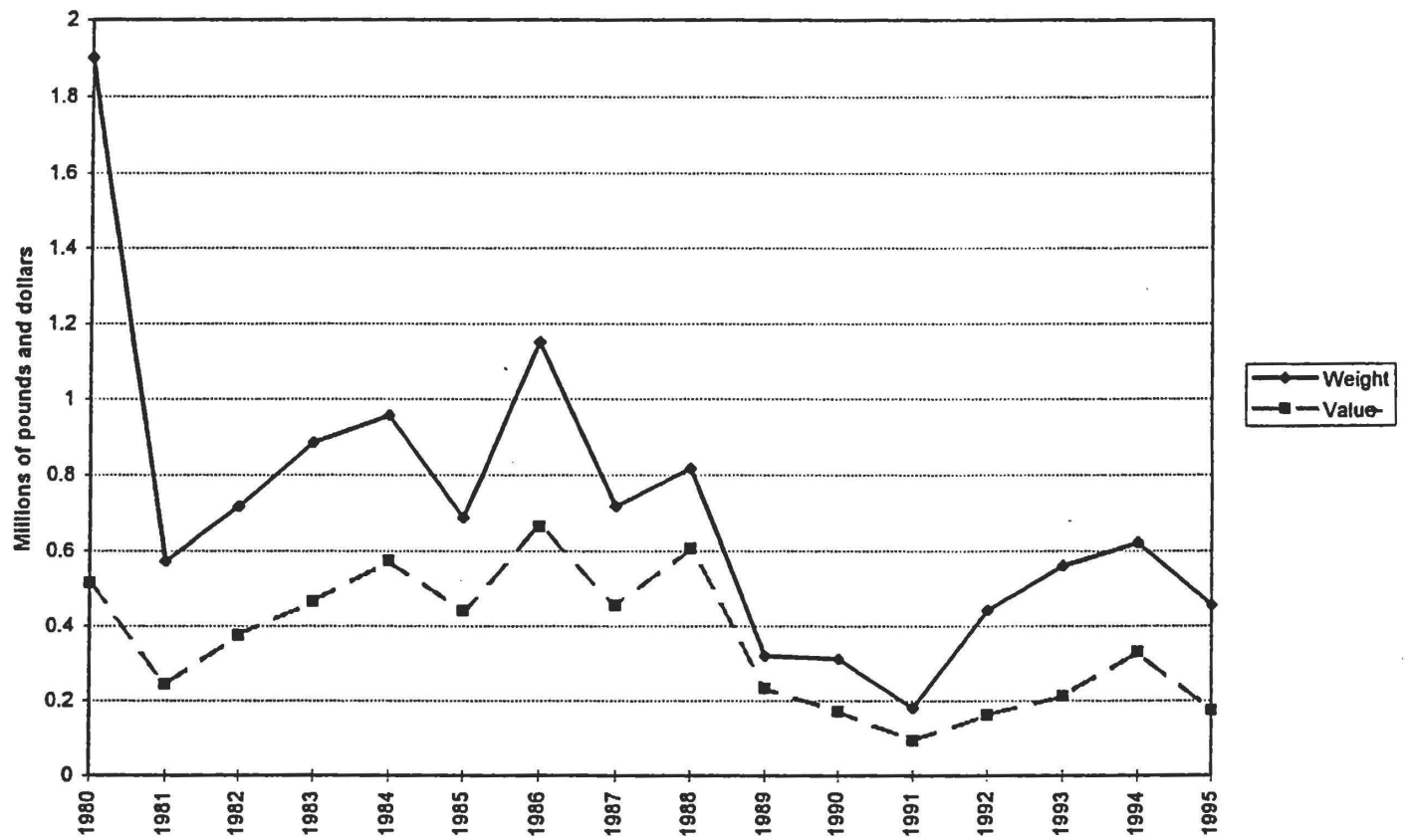


Fig. 45. Annual commercial landings of coastal fish.

Landings by shrimp trawlers (mostly kingfishes) increased, but haul seine production (the major contributor) declined 27% and there was no gill net fishery. The haul seine fishery has been subject to weather conditions, which affect both mullet migrations and fishing conditions in the surf. Spot and mullet were the principal species targeted by the seiners. Overall landings of spot equalled the 15-year average, but mullet production was well below historical norms.

RIVER FISH

Landings were the highest since 1987, reflecting both a resumption of significant river herring fishing (landings confidential) and increased American shad catches. Aggregate shad landings were 285,000 pounds worth \$257,000.

The trend in statewide shad landings is shown in Fig. 46. Most of the increase appeared attributable to Santee River fish. Reported landings for other rivers have been in a prolonged decline; however, upriver landings have been largely unreported and trends in total landings by river are therefore speculative. River CPUE indices derived from data provided by some fishermen have been highly variable, but have not shown declines consistent with those indicated in the landings data.

RECREATIONAL FINFISH FISHERY

This section refers to shore-based, charterboat, and private boat hook and line fishing. More detailed information can be obtained from Low et al. 1996 (Data Report 24).

PARTICIPATION AND EFFORT

Total participation was estimated by the NMFS at 420,000 fishermen. Out of state residents (281,000) comprised the largest group (67%). Coastal residents (91,000) represented 22% and noncoastal residents (48,000) contributed 11%. The trends in estimated annual participation are shown in Fig. 47. As noted in the 1994 report, the figures for 1994 appeared unrealistically high. They were later revised substantially downward by the NMFS and the replacement values are shown here.

The number of coastal residents was the lowest since the MRFSS began and but 57% of the 10-year average. The estimate appears realistic, however, given the number of marine recreational fishing stamps sold (90,009 in FY 1994/1995), predominantly to private boat anglers (the stamp is not required for shore-based fishermen or charterboat anglers). About 80% of these are typically purchased by state residents. Out of state participation was 97% of the 10-year average, while the total number of anglers was about 79% of the 10-year average. Charterboats reported carrying 24,028 anglers, compared to 26,175 in 1994.

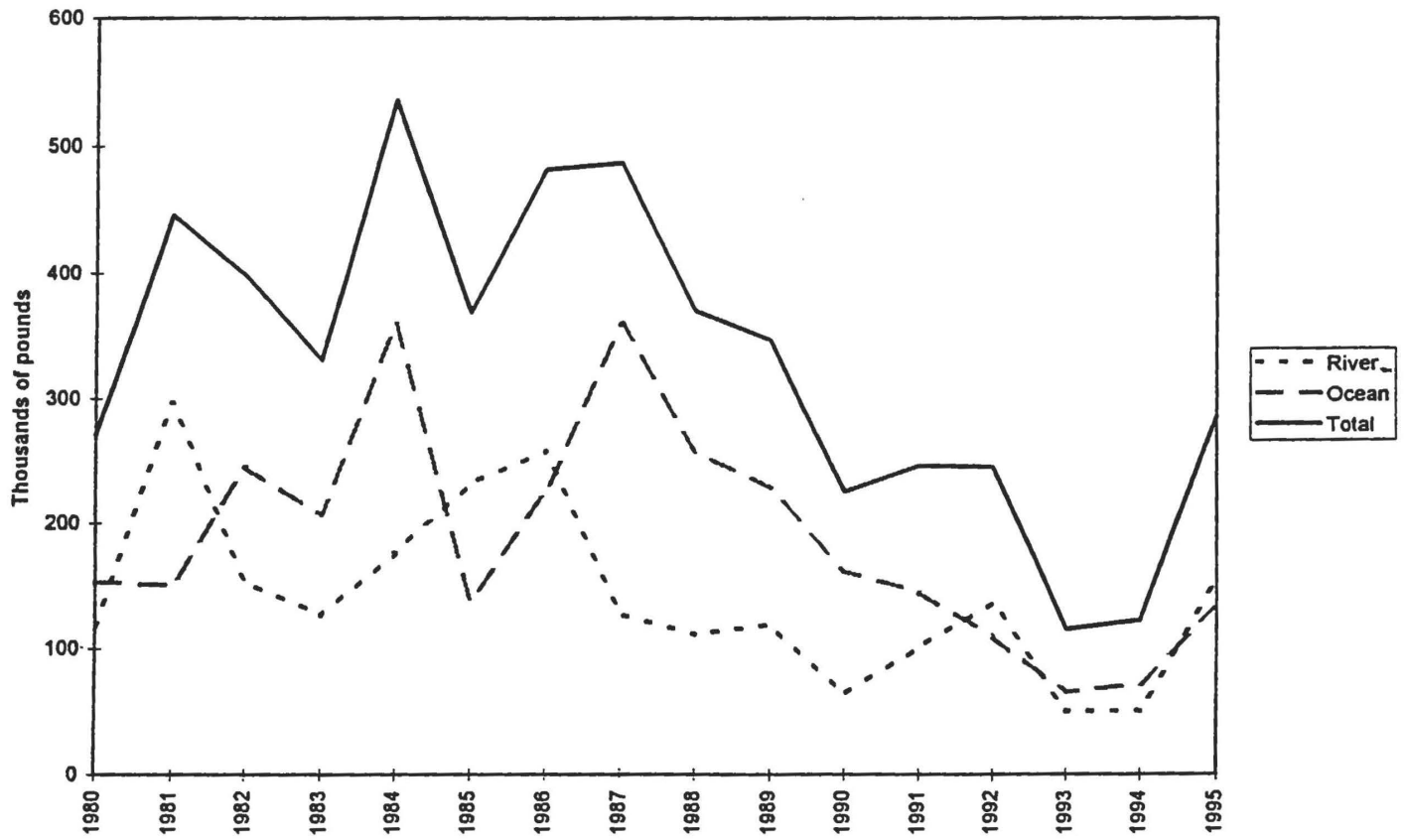


Fig. 46. Annual commercial landings of American shad.

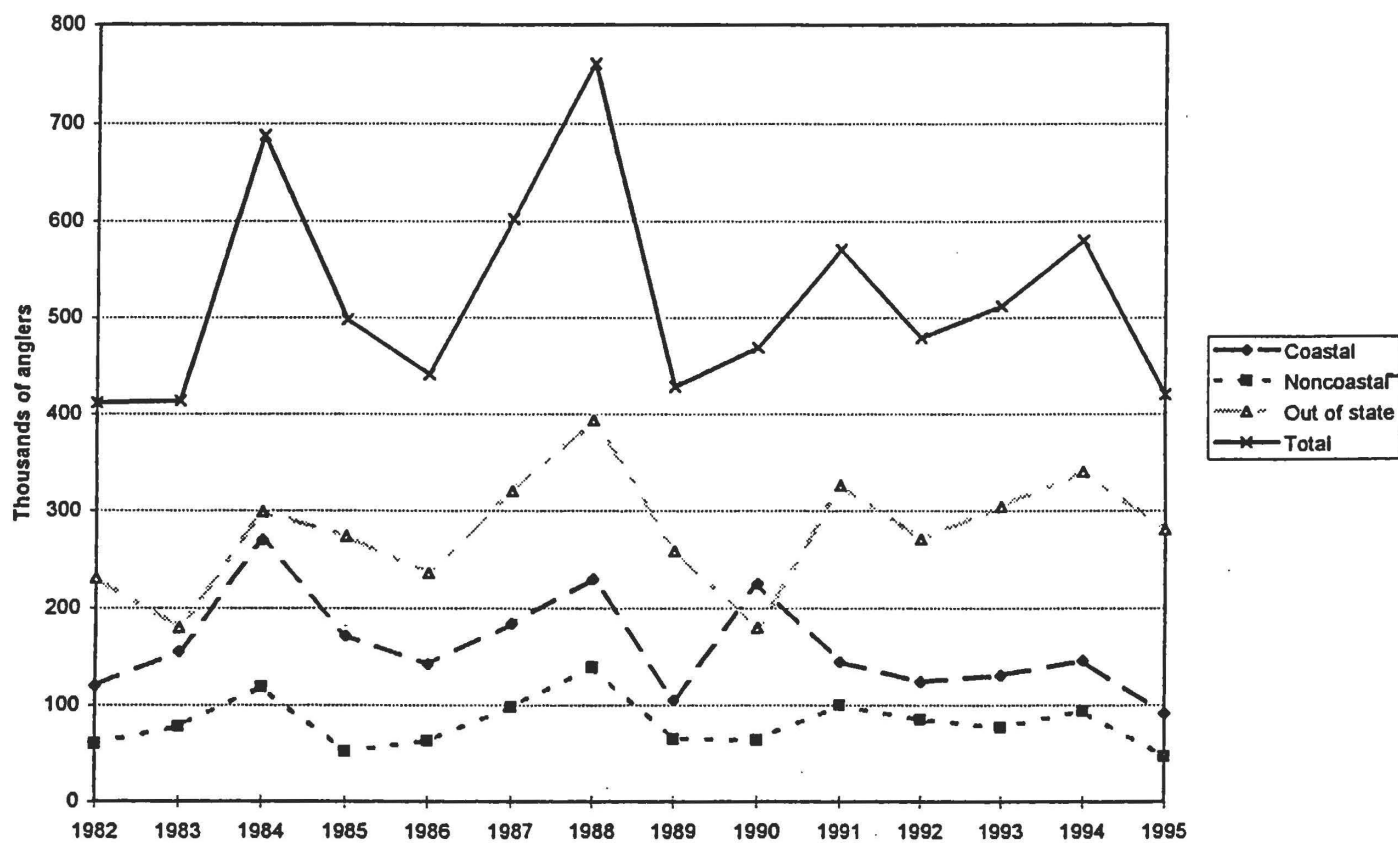


Fig. 47. Estimated participation in the recreational hook and line fishery.

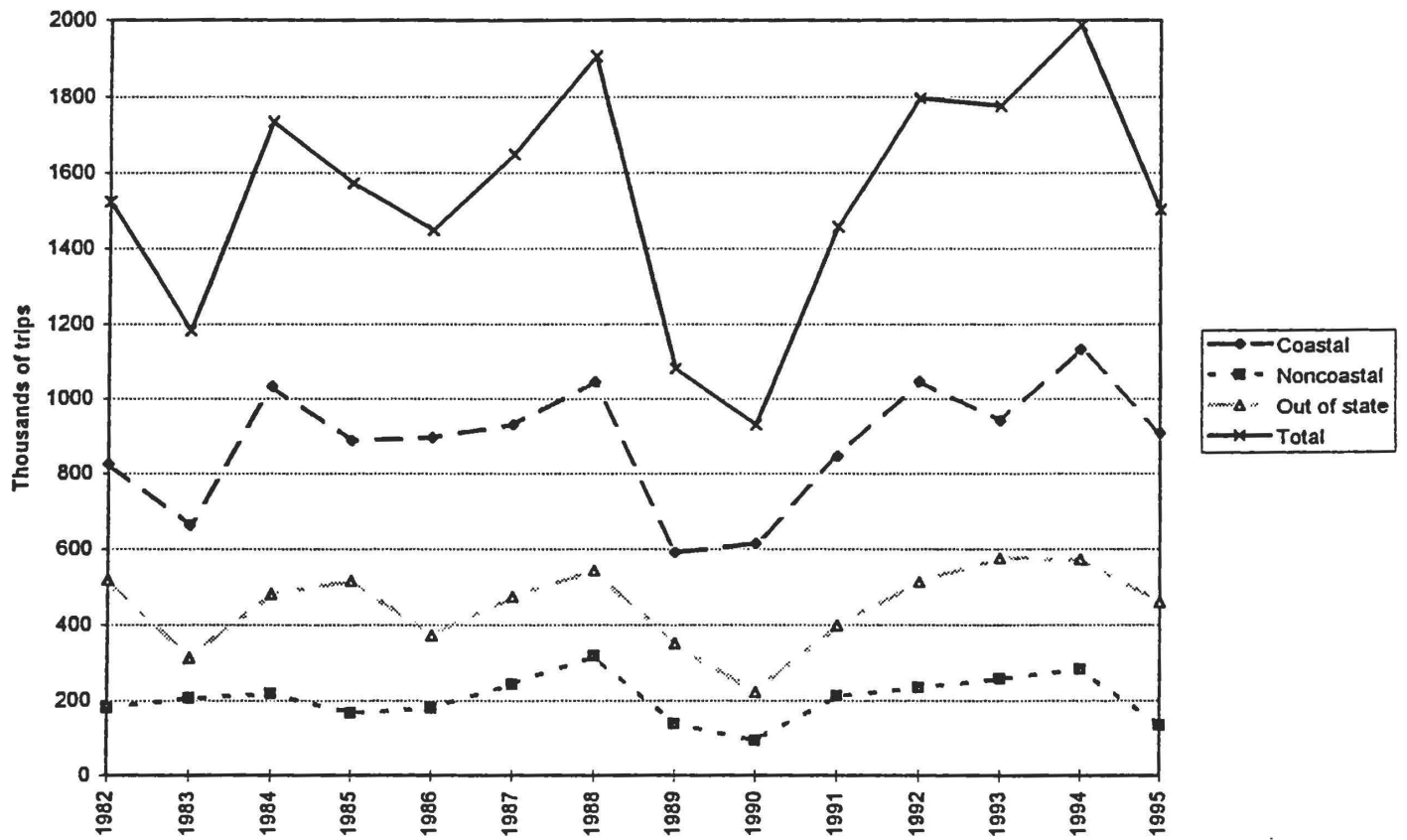


Fig. 48. Estimated effort in the recreational hook and line fishery.

The trends in estimated effort are shown in Fig. 48. Total effort in 1995 was 4% the 10-year average. Effort by both coastal and out of state residents also approximated the long-term average. Reported pier effort was 203,576 angler-trips, slightly fewer than in 1994 even though a large facility opened in mid-year at Folly Beach. Ten piers were in operation compared to nine in 1994. Reported charterboat effort was 5,714 boat trips vs 5,951 in the previous year.

CATCH AND CATCH RATES

The NMFS catch estimates based on the MRFSS were vulnerable to large sampling errors for many species, due to low frequencies of reported catches and highly variable numbers of fish in these catches. Misidentifications and confusion over common names contributed, particularly where large percentages of a species were reported released. For these reasons, the figures listed in Table 1 should be considered highly speculative for many species.

The estimated total catch was 6.589 M fish of marine species. The contribution by fishing mode is indicated in Table 2. The NMFS estimates of charterboat landings were much higher than those reported to the MRD.

Nearly all of the landings shown for oceanic pelagic species were attributed to the charterboat mode, since offshore private boat anglers targeting this group were seldom encountered. The principal species landed was dolphin. Anecdotal accounts indicated that recreational fishermen, as well as the commercial sector, enjoyed an exceptional year with this species. Billfish catches were reported to the MRD through a voluntary public program with 93 blue marlin, 22 white marlin, and 110 sailfish documented. More than 95% were released alive.

The reef fish catch was largely estimated from charterboat angler interviews and the NMFS numbers shown appeared to be far too large for most species. Porgy landings consisted entirely of red porgy, while those for snapper were exclusively vermilion snapper.

Catches of mackerels also were largely based on charterboat intercept data and appeared to be much too large. Charterboat catch rate data indicated mediocre success for king mackerel, compared to that in recent years, although both CPUE and landings were slightly better than in 1994.

The dominant inshore sportfish landed in 1995 was the red drum. Although the large catch credited by the NMFS to the charterboat mode was very unrealistic in view of information reported to the MRD, it was still a very good year for this species. Size distribution of retained fish reflected a larger contribution of bigger fish than in recent years and anglers reported releasing many fish over the 69 cm (27 in) maximum size

Table 1. Estimated hook and line catch (in thousands of fish) by recreational anglers. Does not include headboat catch.
Source: NMFS.

Category	Retained and discarded dead	Released	Total
Oceanic pelagics			
Dolphin	7	0	7
Wahoo	<1	0	<1
Reef fish			
Black sea bass	258	359	617
Groupers	5	6	11
Snappers	14	5	19
Porgies	41	12	53
Grunts	4	25	29
Triggerfish	3	0	3
Spadefish	5	1	6
Spottail pinfish	9	23	32
Amberjack	0	<1	<1
Coastal pelagics			
King mackerel	56	3	59
Spanish mackerel	26	13	39
Bluefish	153	218	372
Creville jack	2	2	4
Barracuda	1	5	6
Little tunny	8	0	8
Cobia	<1	<1	1
Inshore sportfish			
Red drum	222	375	598
Spotted seatrout	238	204	442
Seatrout, unclass.	9	44	53
Weakfish	32	0	32
Southern flounder	152	7	159
Flounder, unclass.	3	53	56
Sheepshead	106	20	126
Inshore bottomfish			
Kingfishes	209	280	489
Spot	872	325	1,197
Croaker	76	107	183
Black drum	29	3	32
Pompano	12	56	67
Sharks			
Sharpnose	33	11	44
Blacktip	3	4	7
Unclassified	28	188	216
Other	259	1334	1593

Table 2. Estimated total catch (in thousands of fish) by mode.
Source: NMFS.

Category	Shore	Charterboat		Private boat
		NMFS	MRD	
Oceanic pelagics				
Dolphin		7	5	
Wahoo		<1	<1	
Reef fish				
Black sea bass	3	190	20	424
Groupers		11	3	
Snappers		15	10	4
Porgies		46	5	7
Grunts		29	5	
Triggerfish		3	1	
Spadefish	4		<1	2
Spottail pinfish		9	1	23
Amberjack		<1	<1	
Coastal pelagics				
King mackerel	<1	56	6	2
Spanish mackerel	2	27	7	10
Bluefish	169	74	3	129
Creville jack		1	1	3
Barracuda		6	1	<1
Little tunny/bonito		21	<1	
Cobia		1	<1	
Inshore sportfish				
Red drum	18	158	6	421
Spotted seatrout	26	94	4	322
Seatrout, unclass.				53
Weakfish	17	13	<1	2
Southern flounder	11	6	<1	142
Flounder, unclass.	7			49
Sheepshead	<1	58	1	68
Inshore bottomfish				
Kingfishes	389		<1	100
Spot	928		<1	269
Croaker	133		<1	49
Black drum	9	14	<1	9
Pompano	67			<1
Sharks				
Sharpnose	14	12	2	18
Blacktip		4	3	3
Unclassified	122	13	4	80
Other	510	86	2	860

limit. About 63% of the total catch was reportedly released. The catch of spotted seatrout was also relatively good, although average size was small with about 50% of the total catch apparently released. Total estimated catches of both species were appreciably higher than those in 1994.

Estimated landings of southern flounder and sheepshead were about the same as in 1994. Average size of both maintained the increasing trend indicated in recent years. About 28% of the southern flounder catch appeared to have been released.

Inshore bottomfish comprised a large percentage of the shore landings, particularly those of ocean pier fishermen. Spot was the most numerous fish caught by South Carolina anglers, as has been the case in nearly every year. Catches of spot, croaker, and kingfishes have fluctuated widely, a typical characteristic for such short-lived species.

The identification of sharks was speculative, since 87% of the unclassified category was released. Small coastal species such as the sharpnose and bonnethead appeared to dominate the overall catch. The NMFS closure of the fishery for the large coastal group, which includes the blacktip popular with sportfishermen, did not apply to recreational anglers (who continued to fish under the bag limit provision).

HEADBOAT FISHERY

The NMFS classified 15 vessels as headboats in 1995, compared to 20 the year before. The USN recreational services vessel was delisted, two boats were reclassified as charterboats, and two were sold out of state. The statistics were provided by the NMFS Laboratory at Beaufort, North Carolina, which used effort conversions and vessel weighting factors to adjust the raw data provided to the MRD by vessel operators.

Effort and catch were classified in inshore (nearshore) and offshore categories. Inshore or nearshore referred to grounds <25 miles offshore (the "blackfish banks"), while offshore applied to areas farther offshore (the "Gulfstream" or "snapper banks"). The principal target in inshore areas was black sea bass, while offshore effort was directed at the snapper/grouper complex. Catch and effort data are listed in Table 3.

Inshore effort reached the lowest level recorded since the data series began in 1974. Offshore effort was slightly below that reported in 1994, but relatively high by historical standards (Fig. 49). Total effort remained similar to that in the past three years. Bad weather in May and August, particularly, may have held effort down somewhat.

Table 3. Estimated catch (numbers of fish) and effort (angler-days) in the headboat fishery. Source: NMFS.

Category	JAN-MAY		JUN-AUG		SEP-DEC	
	Ins.	Off.	Ins.	Off.	Ins.	Off.
Red porgy	286	8596	529	11381	8	3595
Other porgies	2081	3643	7773	5056	2834	2425
White grunt	2168	3450	6336	10574	1257	2721
Other grunts	4511	11479	28489	15339	6392	5219
Vermilion snapper	1635	66481	1621	89311	1892	38808
Red snapper	37	470	104	172	4	79
Other snappers	61	551	3	130	3	20
Epinephelus grouper	95	622	430	1448	60	489
Mycteroperca grouper	218	5711	353	5823	139	2109
Triggerfish	389	4189	500	10468	822	4021
Black sea bass	22857	20546	44915	23674	14492	4806
King mackerel	61	151	73	437	208	211
Sharks	213	243	596	1272	47	784
Other	491	6453	1911	5804	898	1648
Angler days	6703	9194	20954	14969	4594	5325

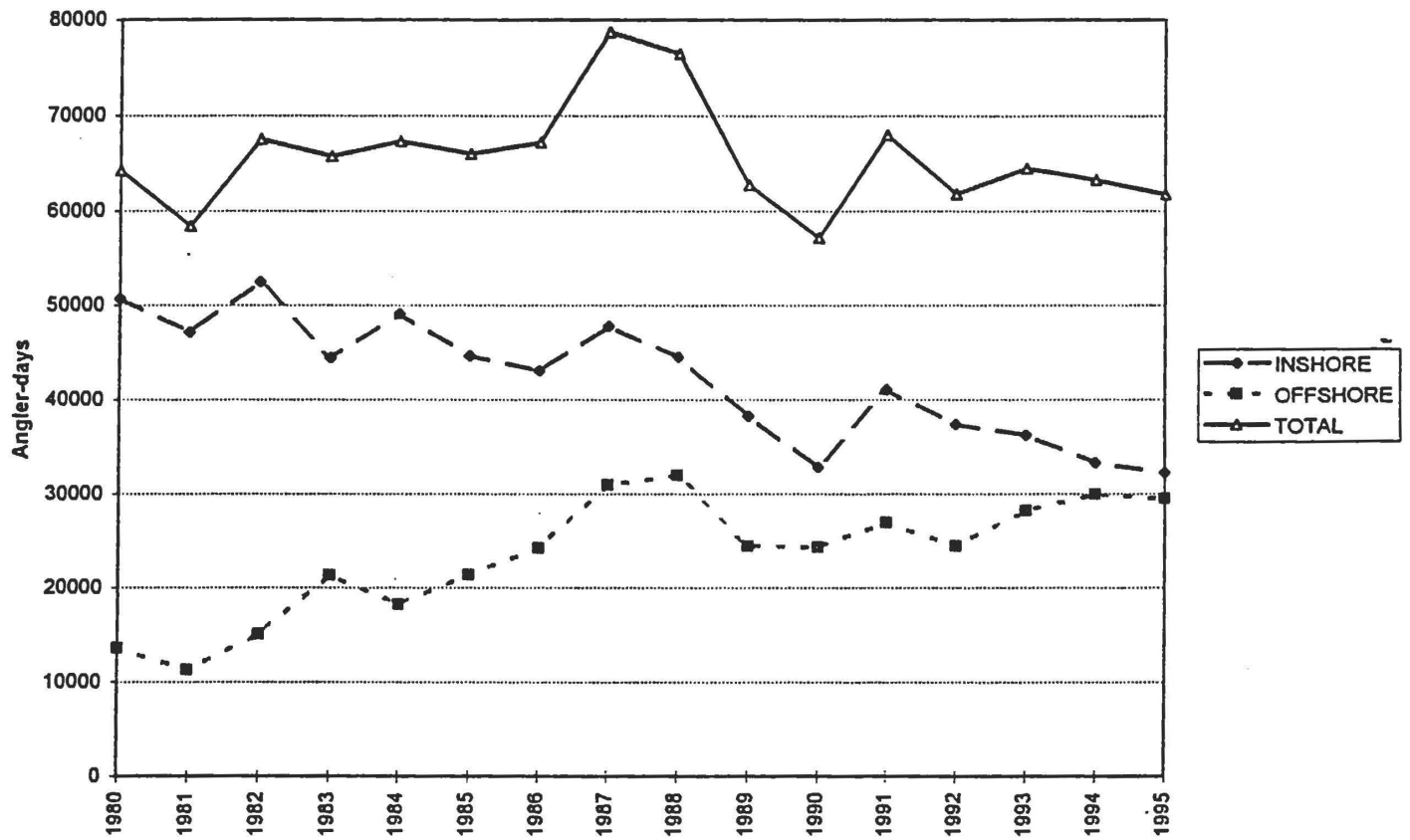


Fig. 49. Estimated effort in the headboat fishery.

The inshore catch (pounds) was almost identical to that in 1993, the lowest on record (Fig. 50). The offshore catch was about the same as in 1994. Total landings were relatively low by historical standards.

Catch rates (pounds/angler-day) were relatively low in both areas (Fig. 51) with inshore CPUE barely above the record low set in 1993. The offshore catch rate was a little below the average for the previous ten years.

Species composition (Fig. 52) was similar to that in recent years. For the third consecutive year, vermilion snapper was the dominant species in both numbers and weight in the overall landings, representing 25% of total landed weight. Landings approached those of the commercial snapper reel fishery (Fig. 53).

The impact of the 30 cm (12 in) minimum size limit imposed on commercial fishermen in January, 1992 was obvious on their landings, then about two-thirds of the combined catch. In contrast, the 254 cm (10 in) recreational minimum size limit did not reduce the headboat landings. The difference may in effect have conferred a competitive advantage to the recreational fishery, given the predominantly small size of fish in the headboat catch. In 1995, the vast majority of the vermilion snapper caught were small with an average weight of 0.73 pound for retained fish, little changed from that in recent years.

Groupers were the next largest weight contributor (15%) with the largest landings (87,000 pounds) since the record year of 1983. Scamp and gag (*Mycteroperca* spp.) dominated the landings with 80,000 pounds and 14,000 fish (Fig. 54). Scamp was the most numerous species, although most barely exceeded the minimum size limit. The average weight of *Mycteroperca* spp. was a relatively low 5.6 pounds. CPUE for this group was the highest observed to date. Landings, average size, and CPUE for *Epinephelus* spp. continued the severely depressed levels of the last decade with hinds the principal component.

Black sea bass dropped to the third highest volume contributor (13%) with both numbers of fish and landed weight the lowest reported to date. Most of the catch was taken inshore, where the species represented 52% by number and 40% by weight of the landings. Most of the fish were very small, particularly in inshore areas where the average weight was only 0.51 pound. About 37% by number of the total catch was taken offshore, where average size was a little larger (0.68 pound).

The long-term decline in the headboat catch of sea bass generally has paralleled that of overall landings (Fig. 55). Since the early 1980's, the recreational sector has accounted for the majority of the annual landings. The MRFSS trendline refers to the aggregate estimated catch in the shore, charterboat, and private

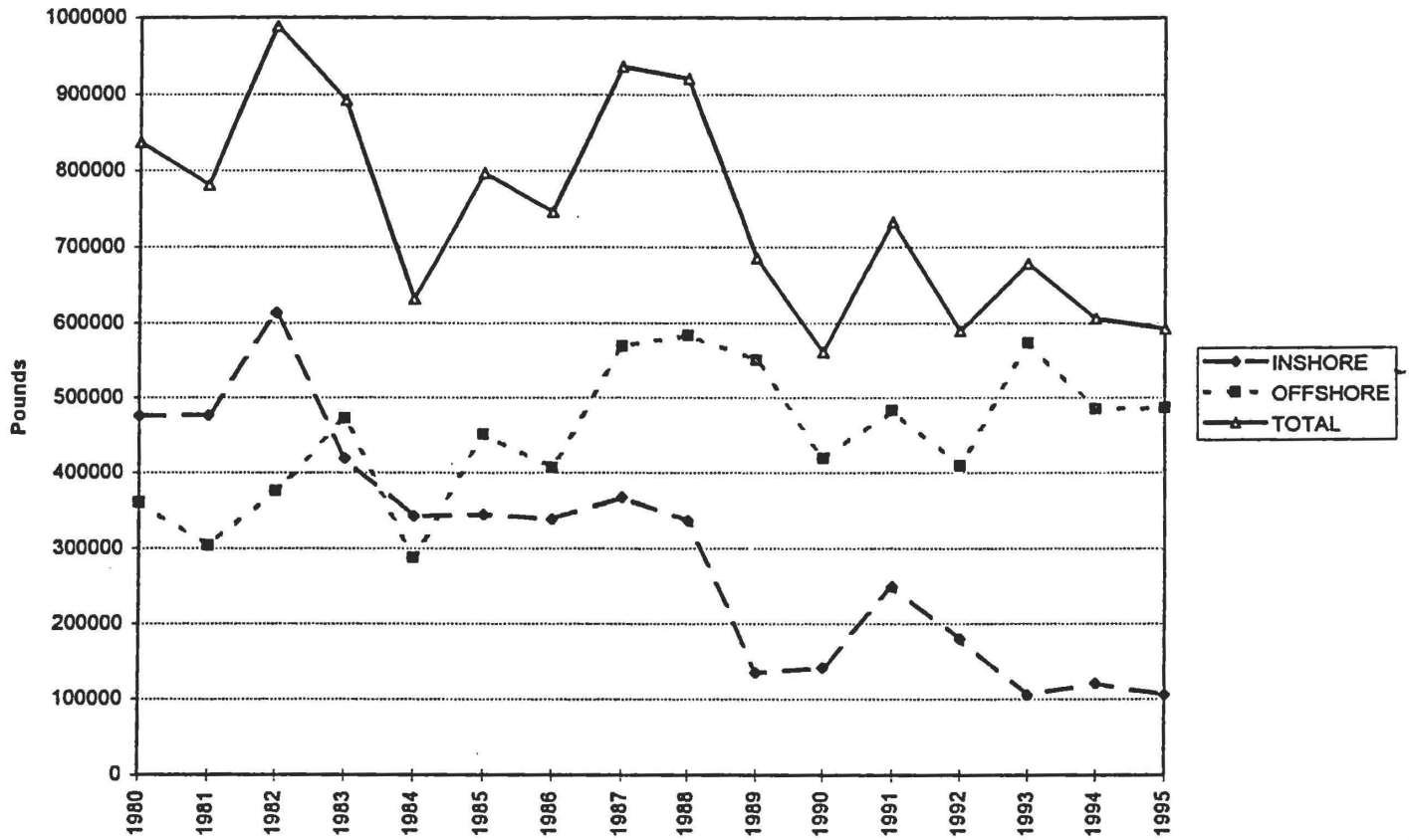


Fig. 50. Estimated catch in the headboat fishery.

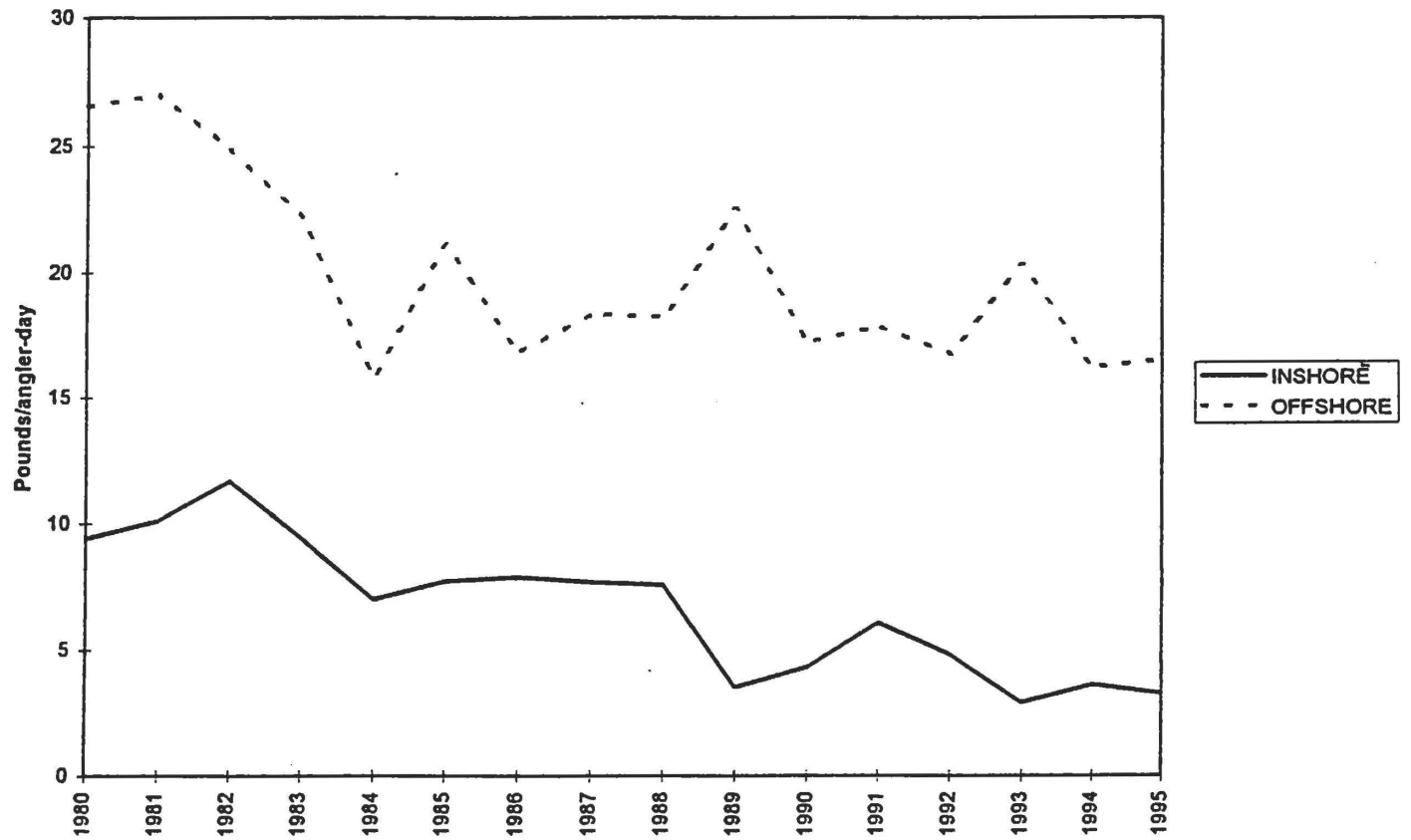


Fig. 51. Average catch rates in the headboat fishery.

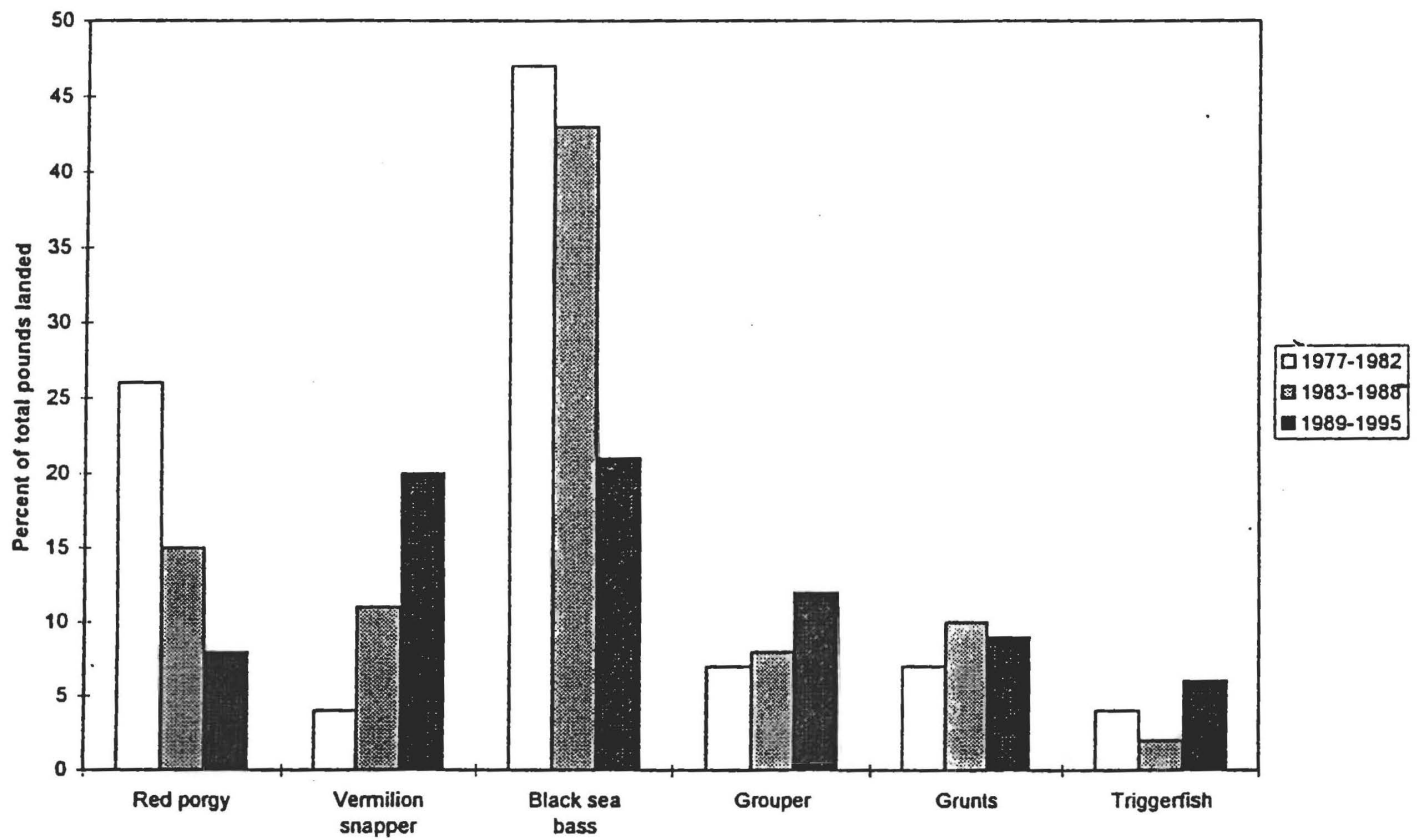


Fig. 52. Species composition of the headboat catch.

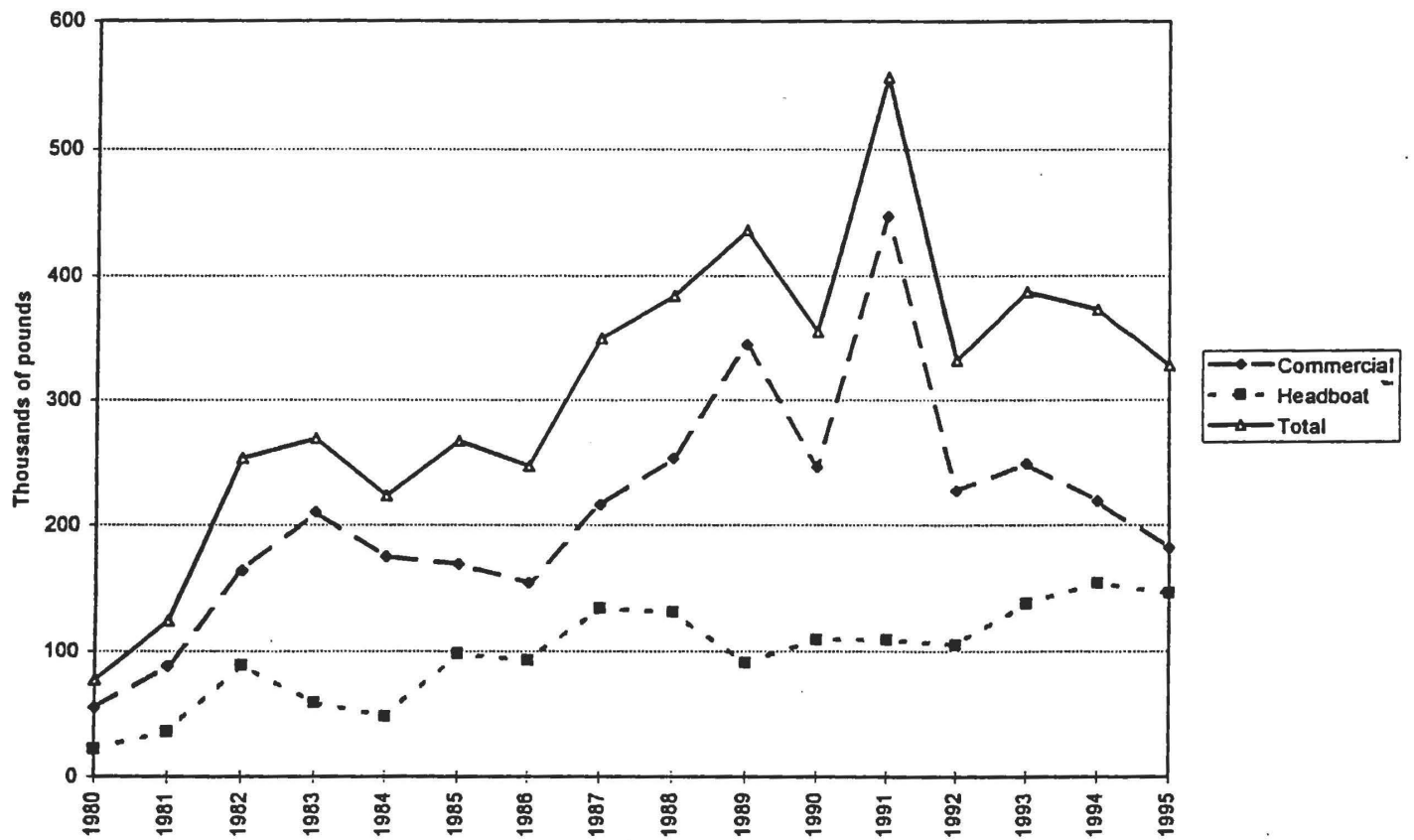


Fig. 53. Hook and line landings of vermilion snapper.

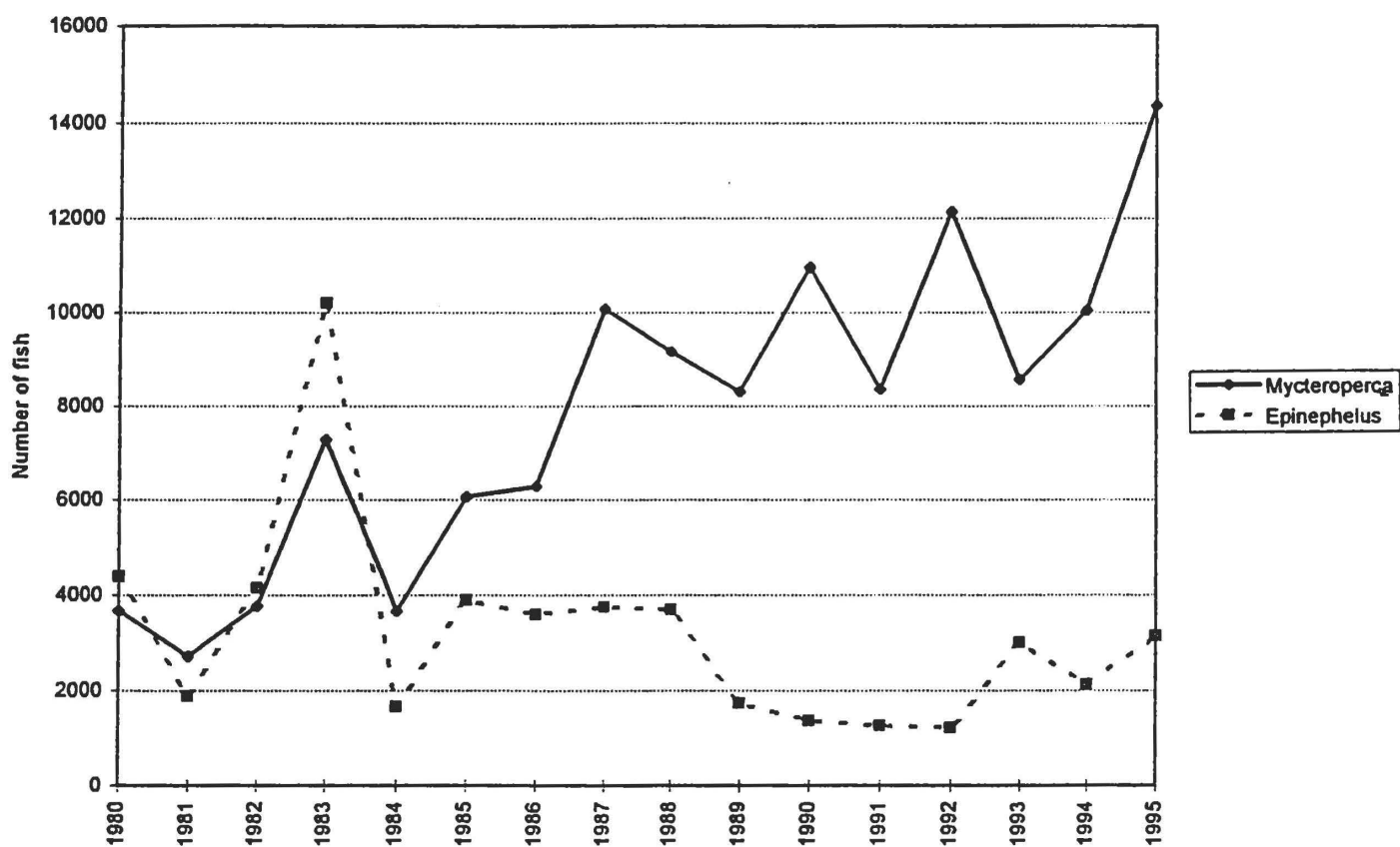


Fig. 54. Headboat landings of groupers.

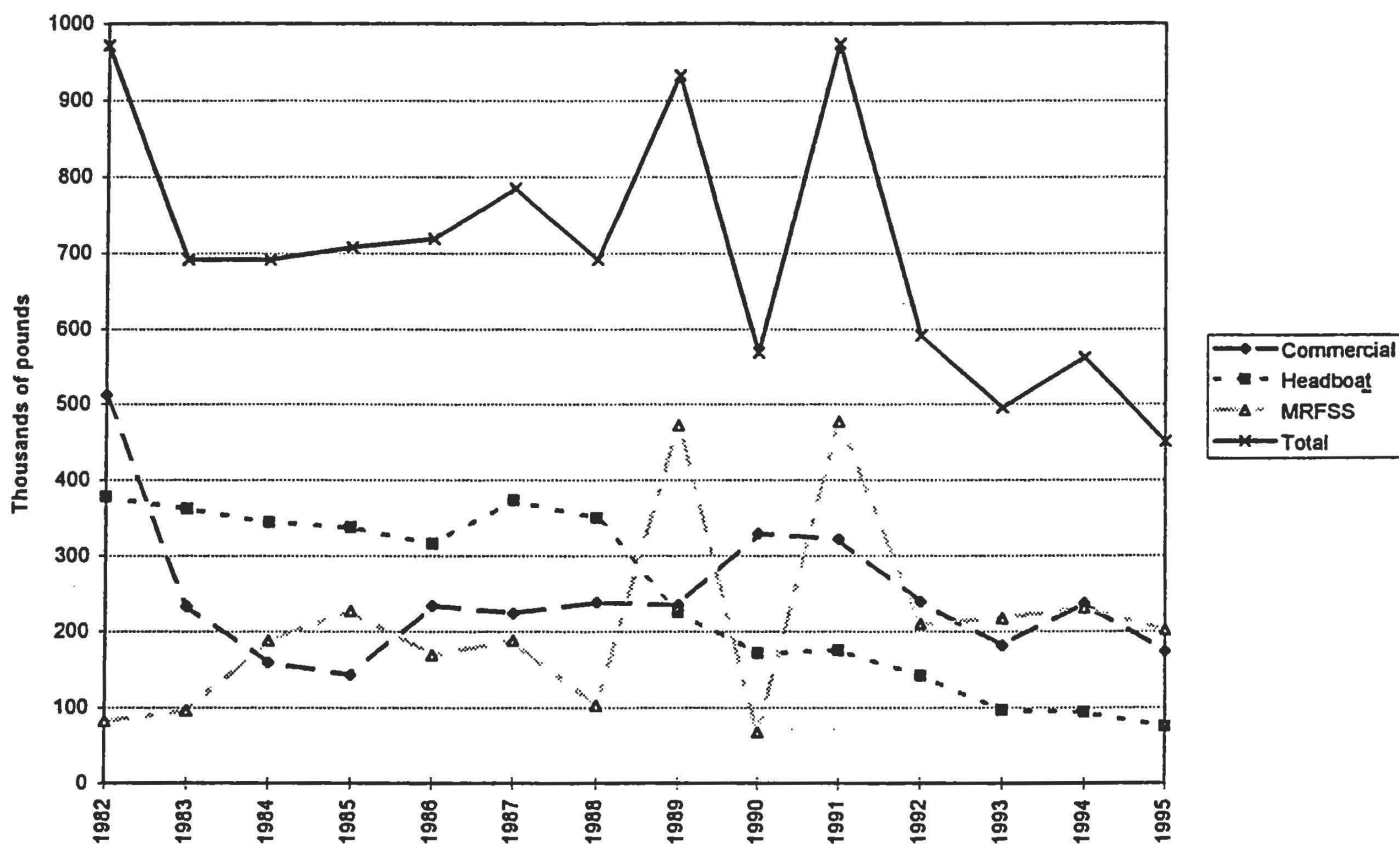


Fig. 55. Landings of black sea bass.

boat modes and the figures for 1989 and 1991 appeared to be obvious statistical outliers, attributable to sampling error. Of the three major harvesting categories, the headboat fishery has experienced the largest decrease in catches.

Since the early 1980's, most of the black sea bass landings by both commercial and headboat fishermen have been taken from Charleston north. This area, particularly inshore of the 10-fathom curve, was disturbed by Hurricane Hugo in 1989. Several of the artificial reefs had material moved about and some live bottom areas appeared to have been covered over. Some fishermen have suggested that the effects of the hurricane have contributed to the obvious decline in landings, particularly at artificial reefs and other inshore areas.

In the late 1970's, red porgy typically comprised about one-third of the total headboat catch by weight. In 1995, the contribution was only 5%, the lowest on record, with landings and CPUE also the lowest to date. Average size remained unchanged. Overall landings have dropped dramatically in the last 15 years with similar trends for both major user groups (Fig. 56). The universal 30 cm (12 in) minimum size limit came into effect in 1992, but has not altered these trends for either group.

Trends in CPUE for the most numerous components of the headboat landings are shown in Fig. 57. Numbers of fish caught appear to be a more influential factor with typical headboat anglers than average size: many customers are from inland states and accustomed to small freshwater fish, anyway. The pounds of black sea bass landed per angler-day have declined steadily and drastically during the last 15 years, a substantial negative factor for the inshore fishery. Red porgy and vermilion snapper are taken mainly by the offshore boats and the decline in number of red porgy per angler has been compensated for by the increase in number of vermilion snapper taken.

The relative importance of white grunt and gray triggerfish has been gradually increasing. White grunts seem to be appearing in areas where they were previously uncommon in the landings, perhaps supplanting the previously abundant red porgy.

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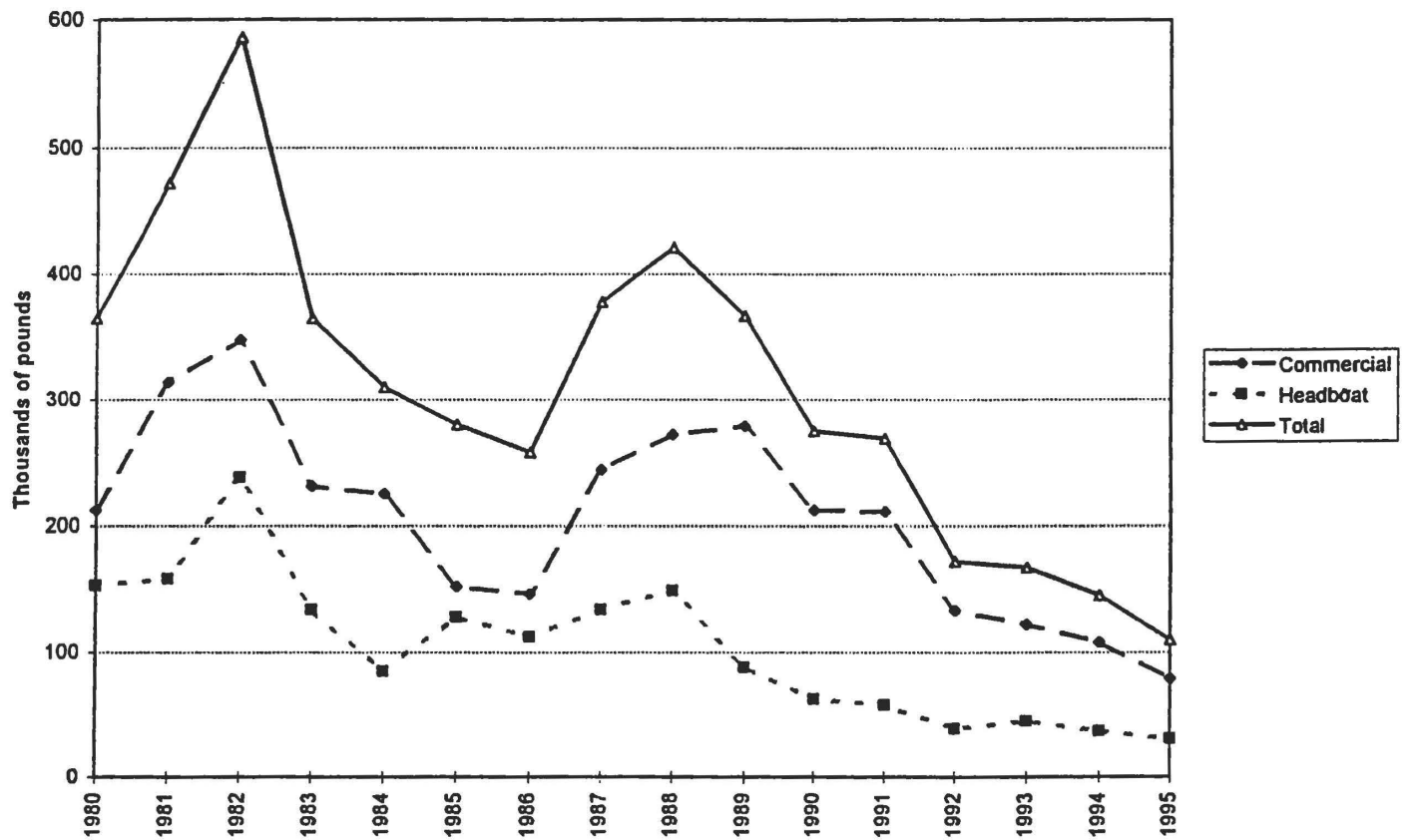


Fig. 56. Hook and line landings of red porgy.

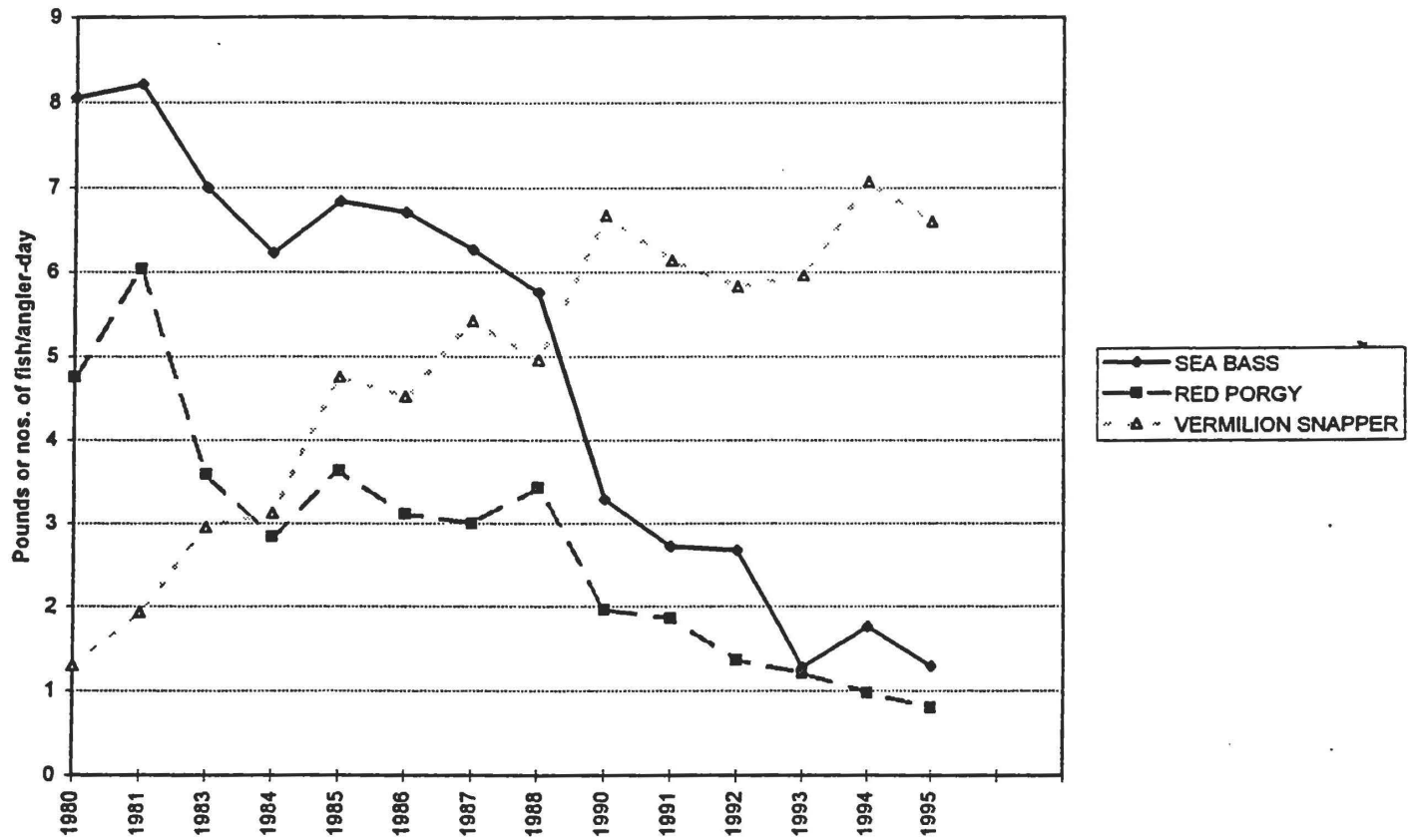


Fig. 57. Headboat catch per unit of effort.